BREAK-IN

September/October 2012

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

# Amateur Radio and Electronics

in New Zealand since 1928

## In this issue:


- The folded dipole and its derivatives; Part 2
- Using computer headsets for your transceiver
- JBOT; an SSB linear
- What is radio astronomy?
- 30 m QRSS beacon transmitter
- Working the big satellite
- Powering your Shack "off the Grid"
- Notice of Elections; Amateur Radio Westfest 2012
- ZL Crossword No.18
- Book review; *"Test Equipment for the Radio Amateur"*
- Jamboree on the Air; Labour weekend 2012


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# BREAK-IN

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**September/October 2012**

*The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.*

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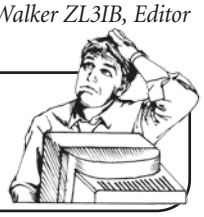
# From The Editor

John Walker ZL3IB
<editor@nzart.org.nz>

Elsewhere in this issue you will find a new column *'From the Break-In Archives'* produced by Jim Pye ZL2PU who has kindly offered to scan and archive early copies of *Break-In*. This will be a valuable addition to our NZART historical records and will be a useful supplement to the later year's editions which are available as PDF files on earlier *Call-Book* CDs and from the NZART web pages. It is noble venture and will involve a lot of work by Jim. When I take a nostalgic look at 1950 – 1970 editions of *Break-In* I am impressed, and envious, at the number and range of advertisements; not only for components and equipment but also for a wider range of items like metalwork. But then we have to remember that those were the days when few hams operated, or could afford, commercial gear so home-brewing was the order of the day.

I would still welcome more copy on general topics as "The other ham's station" or short reviews of newly-acquired equipment, experiments with antennas, etc. An ever-increasing problem facing hams having to move to new premises in so-called 'gated communities' or new sub-divisions, or retirement villages is how to still enjoy their hobby. Many of these places are operating very restrictive rules about the erection of antennas etc so how are these folk managing to continue their hobby? I am sure that our readers would be interested to learn how some of them may have overcome these problems; going mobile perhaps ?

73 *John Walker ZL3IB, Editor*



Next deadline for copy is
10 November 2012

**Contributions to Break-In**

*Break-In* is a forum for NZART member's amateur radio projects, experiences, opinions and news. Your contributions and feedback is welcomed. Contact the Editor John Walker ZL3IB at <john.zl3ib@ihug.co.nz>

## New Zealand Association of Radio Transmitters INC

(Founder Member of the International Amateur Radio Union Region 3)

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# Magazine Survey

Compiled by Grahame Fraser ZL3SJ
<grahame.fraser@canterbury.ac.nz>

**Amateur Radio (WIA)**
**July 2012**

p.22 Introducing Project HORUS: High altitude ballooning in South Australia (19 of 27 reached 30 – 41 km)
p.34 Magnetic loop for HF pedestrian mobile
p.44 Review: The Icom ID-31A 70 cm handheld transceiver
p.49 A transceiver control and audio interface using USB components

**August 2012**

p.6 A multipurpose two channel 433 MHz remote control
p.8 How to tune your 20 metre band antennas to the 12 metre band (using unexpected resonances around 25.7 MHz)
p.10 The 'Match 22' – a micro antenna tuner coupler for portable use
p.14 The Blob Board 500 mW CW transmitter
p.27 Air travel with radios (serious security difficulties with carrying a handheld on board)
p59 AMSAT: KiwiSAT (www.kiwisat.org.nz)

**CQ**
**August 2012**

p32 Review: The Ten-Tec Model 1215 "Ten 'T' Tuner" Kit
p.44 A Portable 20-meter Station – Pt. I
p.64 Back to Basics (getting started with PSK31)
p.96 Propagation:Visualizing the Ionosphere using Google Earth (<http://g.nw7us.us/xs3Zwz>)

**September 2012**

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p.60 Herringbone Log Periodics and Another AMSAT LEO Antenna
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**QST**
**August 2012**

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p.39 Remote Radio Control Made Easy
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p.65 Backpacking with Satellites

**September 2012**
**Special Emergency Communications/ Public Service Issue**

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p.36 Power Carts for Scouts and Field Operations
p.41 Radio in a Bag
p.43 Storage Battery Planning for Public Service
p.45 Review TEN-TEC R4040/YouKits HB-1B Four Band CW QRP Transceiver
p.63 "Your Antenna's on Fire!" (Big brute amplifiers and plastic flowers don't mix)

**RadCom**
**July 2012**

p.16 Start Here: A short history of radio (part 1)
p.18 Homebrew: sensors for the Pinguino PIC board
p.26 Design Notes: Avoidable disasters (lightning) and active antennas
p.30 A square short loop antenna for 160-40m (remotely tuned)
p.40 Digital HF VSWR meter; completing the LCD and LED versions
p.46 ATV: RF coaxial relay expectations
p.70 Antennas: The homebrew Yagi and common mode problems
p.86 Technical feedback: Additional info on ceramic filters in June 2012 RadCom

# Election of President and for the Executive Council To be held March 2013

Notice of appointment of Returning Officer
(Given in accordance with the Constitution of NZART)

I, Evan Sayer, inform members that Council of NZART, having recently directed that an election be held for the office of President and for the Executive Council of NZART in March 2013, have appointed me, to be the Returning Officer for the purposes of such election. Accordingly, I now issue the following Notice of Election.

**Notice of Election**

(Given in accordance with the Constitution of NZART)

I hereby call for nominations for the office of President and for the Executive Council of NZART

Nominations are to be addressed to the Returning Officer NZART Headquarters, PO Box 40 525, Upper Hutt 5140 and must be received by me by 31 December 2012

Every nomination shall be in writing and shall be signed by the person nominating and a seconder and shall be countersigned by the member nominated. The nomination should also contain a certificate signed by all three parties, that the candidate is an active amateur.

A member may be nominated for either or both the office of President and Councillor for a District.

In the election for Council only members attached to branches within the electoral district for which the election is being held are entitled to nominate or be nominated for office or vote in any election. To assist me in ensuring full compliance with this requirement, it is requested that the parties involved in any nomination for Council name their respective branches and state their common electoral district as being, either Northern, Central, Midlands or Southern (as the case may be).

It is desirable that Candidates provide me with personal biographical details before 31st Dec 2012 for the inclusion with ballot papers to be posted out in February 2013 (these may be edited where necessary). A passport-type photograph may also be included.

**Evan Sayer**
Returning Officer

**August 2012**

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**September 2012**

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p.70 Start Here: A short history of radio (part 2) A homebrew Branly-Lodge coherer

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p.10 Over the Horizon on 481THz (0.7W red LED, K-ID2 beacon IC)
p.17 Power Beeper (for protecting low power dummy loads)
p.18 Simple and Inexpensive Bipolar Transistor Tester
p.28 G3ORP Stealth Vertical (40m, 17m, 5m)
p.29 Magnetic Tunable Receive Antenna (ferrite rod tunes with varactor diodes)

# The Folded Dipole and its Derivatives Part 2

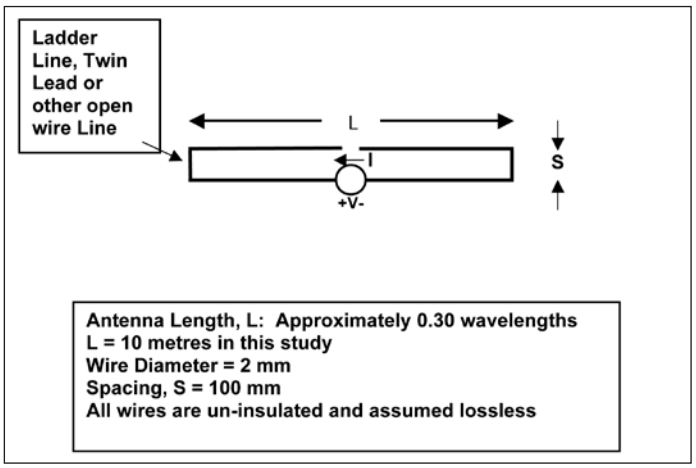
*by David Conn VE3KL*

*(Reprinted from The Canadian Amateur, Sept/Oct 2011)*

*(Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to* <www.rac.ca/tca. Sept/Oct>*)*

## Introduction

*Part I of this series outlined a method for analyzing and understanding how a folded dipole works. It was found that the folded dipole operates partly as transmission line and partly as two radiating dipoles. Part II of the series continues with this discussion to a linearly loaded dipole (see TCA Hotlinks, 1, 2, 3,) and lists some of the more important derivatives that operate in a similar fashion. Many of these derivatives have been discussed in the professional and amateur literature.*


Ladder Line, Twin Lead or other open wire Line
L
I
S
+V-
Antenna Length, L: Approximately 0.30 wavelengths
L = 10 metres in this study
Wire Diameter = 2 mm
Spacing, S = 100 mm
All wires are un-insulated and assumed lossless

*Linearly loaded dipole: L = 10.0 metres, wire diameter = 2 mm, spacing = 100 mm.*

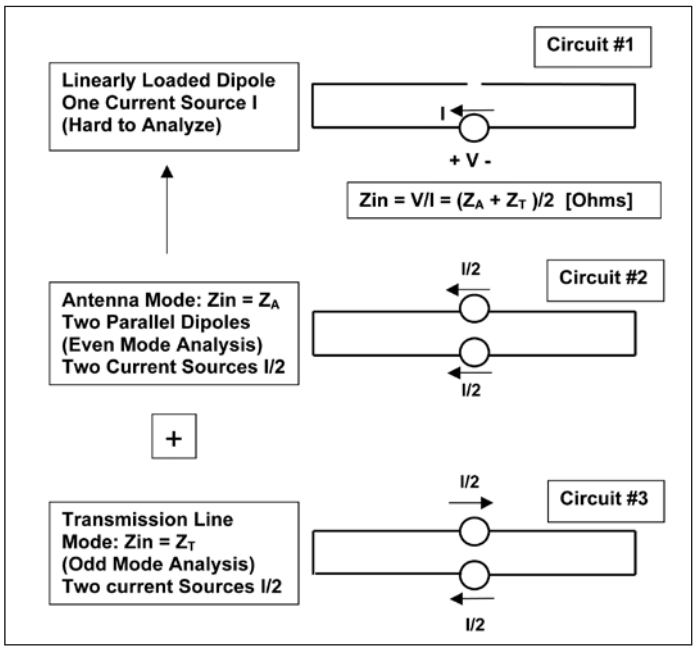
Part II of the series follows part I by using a 10 metre long antenna (see Figure 1) to demonstrate the performance of a linearly loaded antenna. Notice in Figure 1 that the linearly loaded antenna used in this study is similar to the folded dipole except that the folded ends are not connected to each other. The analysis and simulation methods for the linearly loaded dipole and the folded dipole are nearly identical. In fact, the same simulation files are used to study these antennas with only a small change needed in the excitation. However, the antenna characteristics are completely different except for the overall antenna gain. They operate at different frequencies and have very different impedance levels.

Remember that the folded dipole is approximately 0.5 wavelengths long (like a simple halfwave dipole) and its impedance at resonance is approximately 286 Ohms. We find here that the linearly loaded antenna studied has a length of approximately 0.3 wavelengths and its impedance at resonance is 22 Ohms. So, it is much shorter than the folded dipole and like the folded dipole, the impedance is not close to 50 Ohms.

This article also gives the length of the antenna for all of the amateur bands from 160 metres to 10 metres for two different types of lines: 300 Ohm twin lead and 450 Ohm generic ladder line.

## Linear loading

The motivation behind loading antennas is to reduce the size of antennas. The most common method is the use of a loading coil placed near the center of horizontal dipole elements or at the base of a vertical antenna that is used in mobile applications. Another method for making small antennas is to fold part of the main element back on itself. This folding process is referred to as linear loading by many antenna designers, but it is not the only method. Hamstick antennas have a very long loading coil that radiates and can also be considered to be an example of linear loading. Hence, the term "linear loading" is not very precise.




*Linearly loaded dipole circuits: The antenna, dipole mode and transmission line mode. excited by current sources.*

## A circuit model for the linearly loaded dipole

Like the folded dipole, the linearly loaded dipole can be difficult to analyze because it acts as a transmission line and two dipole antennas. This difficulty can be circumvented by decomposing the antenna into a simple transmission line and two dipoles as we did in Part I.

The basic concept is shown in Figure 2. Circuit #1 in that figure shows the linearly loaded dipole as it is built. It consists of a single source that feeds the wires in the center. Here we assume that the wires are fabricated from a section of transmission line with characteristic impedance of 552 Ohms as discussed previously. The antenna impedance is:

$$Z_{\text{linearly loaded dipole}} = V/I \text{ Ohms}$$

Where $I$ is the applied current from the transmitter and $V$ is the resulting voltage.

Circuits #2 and #3 in Figure 2 show how the antenna is decomposed into two separate circuits.

The method of analysis is to find the antenna voltages in the wires in each circuit and then add them together to get the total voltage. This method relies on the concept of superposition that applies to linear systems like antennas when we neglect things like heating and excessive input power.

## Circuit #2

The current sources in circuit #2 are in phase and have the same magnitude. Hence, circuit #2 behaves like two very closely coupled dipole antennas. The impedance of a single halfwave dipole in free space is close to 72 Ohms but this will not be the case for the two coupled dipoles. However, it is the same value as found previously for the folded dipole: 142 Ohms at its resonant frequency. Current sources are used instead of voltage sources since the total current in the center of the top element of the antenna must be zero because of the open circuit condition (see Circuit #1 in Figure 2)

## Circuit #3

Now, look at circuit #3 in Figure 2. In this case, the current sources are out of phase so no radiation occurs. If each section of the line is one quarter wavelength long, the

impedance looking into the line from the generators will appear as open circuits as before.

The input impedance of this antenna is given by:

$$Z_{linearly\ loaded\ dipole} = (Z_A + Z_T)/2\ Ohms$$

This is quite different from the folded dipole case. Here, the input impedance equals the sum (series connection) of $Z_A$ and $Z_T$ divided by 2 while the folded dipole impedance is given by the parallel connection of the circuit components. Here, $Z_A$ is the input impedance of circuit #2 and $Z_T$ is the input impedance of circuit #3 in Figure 2. The resonant frequency for this antenna will occur at the frequency where the capacitive impedance of $Z_A$ equals the inductive reactance of $Z_T$; much lower than resonant frequency of the dipoles. This frequency is best obtained via simulation.

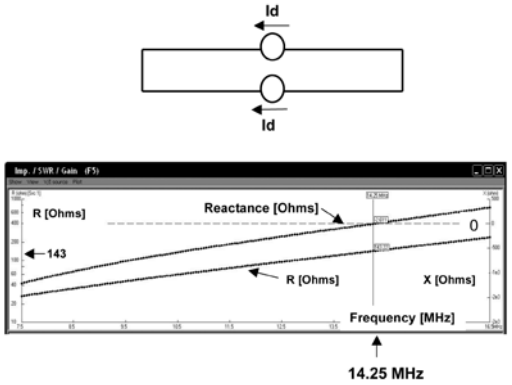
### Circuit simulation using 4nec2 antenna software

The antenna circuits were simulated to check that the operation is as expected from the simple theory as outlined above and to find the frequency of operation

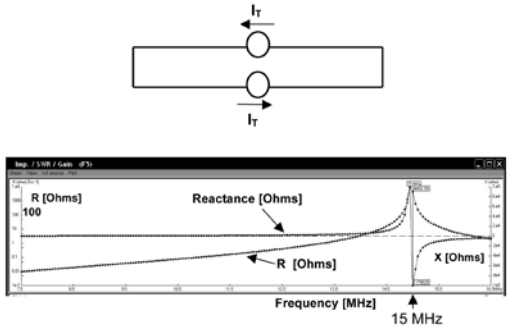
The impedance of the antenna mode (Circuit #2 in Figure 2) is presented in Figure 3. The impedance is plotted from 7.5 to 16.5 MHz. Notice that the resonant frequency, 14.25 MHz, of this mode is exactly that of a dipole and a folded dipole. The simulated impedance at resonance equals 143 Ohms as before; double that of a halfwave dipole because of the strong mutual coupling between the elements. Note that this result only applies to the situation where all wire diameters are the same. Another important observation to make is that the antenna has a capacitive reactance below resonance as before.

The impedance of the transmission line mode (Circuit #3 in Figure 2) is presented in Figure 4. Here, the length of the transmission line is one half wavelength at 15 MHz. Hence the impedance approaches infinity at that frequency as seen in the diagram. The reactance at frequencies below 15 MHz is inductive as expected.

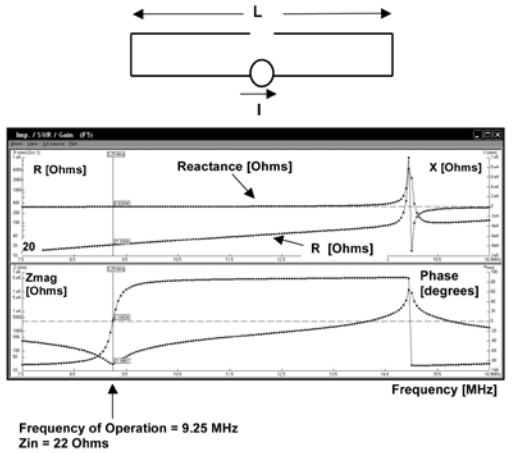
The impedance of the complete antenna (Circuit #1 in Figure 2) is presented in Figure 5. Notice that




*Simulated impedance of two closely spaced dipoles, circuit #2, figure 2: current sources fed in phase. This is called the dipole mode or even mode.*




*Simulated impedance circuit #3, figure 2: current sources fed out of phase. This is called the transmission line mode or odd mode.*




*Simulation of the complete linearly loaded dipole; Z = 22 Ohms at resonance.*

the impedance at 15 MHz is infinite so the antenna will not radiate any power at that frequency. The impedance at 14.25 MHz, the dipole resonant frequency, equals 3650 Ohms (SWR = 73:1). Hence, little radiation will be expected from the antenna at this frequency. However, at 9.25 MHz, the input impedance is 22 Ohms (SWR = 2.2). Hence, the antenna can easily be operated at this frequency.

An approximate formula for determining the length of the linearly loaded dipole for any band of interest is:

$$L = \frac{92.5VF}{F_{MHz}} \quad [\text{metres}]$$

Where, $L$ is the antenna length, $VF$ is the velocity factor of the transmission line being used and $F_{MHz}$ is the operating frequency in MHz. This formula is not extremely accurate and the final length must be obtained experimentally or with a more accurate simulation method.

For example, consider making an 80 metre (3.5 MHz) linearly loaded dipole using 300 Ohm twin lead as the radiating element. The velocity factor for a generic 300 Ohm twin lead is approximately 0.8. Hence:

$$L = 21.1 \quad [\text{metres}]$$

The same antenna made from a generic 450 Ohm ladder line with velocity factor of 0.91 will have a length L of 24.05 metres.

The bandwidth of the linearly loaded dipole is much smaller than the folded dipole. For example, a 10 metre linearly loaded dipole has a 2:1 SWR bandwidth of approximately 500 KHz while the folded dipole has a bandwidth of 2.8 MHz. This is common for nearly all small antennas.

### Other similar antennas

There are many other antennas and matching structures that behave in a similar fashion. These include:

- The terminated folded dipole. This antenna uses a non-inductive load placed at the center of the folded dipole. It has low gain and is not highly recommend for use by amateurs because of its low gain (see *TCA Hotlink,5*)
- The Cobra Folded Dipole (see *TCA Hotlink,6*)
- The Gamma Match (see *TCA Hotlnk, 7*)
- The Slim Jim antenna (see *TCA Hotlink, 8*)
- Short Monopole antennas (see *TCA Hotlink, 1*)

All of the above have the characteristic of the folded dipole in that they rely on both antenna and transmission line currents to describe their behaviour. The antennas are usually short compared to a full sized dipole and hence have been used extensively where space is a major consideration.

### Conclusions

This two part series on the folded dipole and its derivatives laid the foundation for understanding a large group of similar antennas and matching structures that are based on the same operating principles. Most of them are discussed in the now classic work of LB Cebik, W4RNL (*SK*) in his web site. The description of these antennas is at a fairly high level which requires a basic knowledge of even and odd mode currents which were outlined in this series. As usual, it is extremely important to have a careful look at the simulation results as many antenna types including folded dipoles are quite difficult to simulate due to very closely spaced wires that might have different diameters. The final answer comes out in the experiment. Usually the antennas will have to be tuned to meet the final objective.

continued on page 6

# Using Computer Headsets for your Transceiver

*by Graeme Hunt ZL1ANH*

*Always wanted a headset for your transceiver but been put off by the expense? The answer is in your nearest computer shop or big red store. Computer headsets with microphone are available for around $25.00 and will give you hands-free operation for your HF transceiver.*

There are a couple of things to watch out for; do you want single or dual earphones and make sure it has a microphone. They should have two 3.5 mm plugs; pink plug is the microphone, green the headphones. Some microphones fold up nicely against the head band, that's important when you are drinking your cocoa.

Also ensure that they have two 3.5 mm plugs and not a USB plug. Actually specifications like frequency response and impedance aren't that important since your transceiver will shape your audio with its various filters. The headset mics seem to have enough output and I'm getting excellent on-air reports with my cheap computer headset. You will probably find the headphones output will be down a little as there is a considerable impedance mismatch, but not enough that a little more volume control on your rig won't fix. Avoid headsets with in-line controls, that is just something to go wrong later.

You may want to build the plugs and components into a small box with a push to talk switch or just put the components inside the plugs and cover with heat shrink.

Your transceiver handbook will give you the pins for the microphone plug. There seem to be many variations by the transceiver manufacturers on the theme of "how shall we wire the microphone/headphones". For example, some Kenwood circuits use both the mic and headphone jacks to activate the PTT (push to talk). If you don't have your transceiver and current mic circuits Google is your answer. *(G4WPW has a useful web site detailing microphone connection data for a huge number of radios at* <http://homepage.ntlworld.com/rg4wpw/date.html>. Ed)

The important connections are Mic, Mic ground, +5V (approx) and, if you want Push to Talk the PTT pin and transceiver ground. Ignore the up and down pins. Your new computer headset won't be as complicated as your transceiver. The mic will have audio, voltage and ground, phones just the two normal audio connections.

The only components required for this project are some female 3.5 mm plugs, a mic plug to fit your transceiver, an electrolytic capacitor around 25µF/ 30 V and a 4.7k resistor (¼ watt is fine). Some of the later transceivers use RJ45 modular plugs which look a little like a telephone jack. I've never tried to wire one of these, my solution was to use a computer cable, chop of the plug from the other and connect an appropriate female plug. Your transceiver may have auxiliary plugs on the rear that you can also use.

### Microphone

Computer headsets use electret inserts which require a low DC voltage to function. This voltage is usually available from the microphone socket on the front of your set. If not then 3V from a couple of AA cells is fine, current drain is very low, they'll last for a long time. Most of the computer headsets use the three contact 3.5 mm plug with tip (mic), ring (+5 volts) and sleeve (mic ground).

A check on the microphone socket of a couple of computers both showed 2.5v+ DC on both tip and ring.

Many of the inserts in microphones that come with amateur transceivers only use the tip and sleeve while the computer headsets seem to use the ring for the DC voltage. The circuits below shown gives both versions, try the +DC voltage on the ring first.

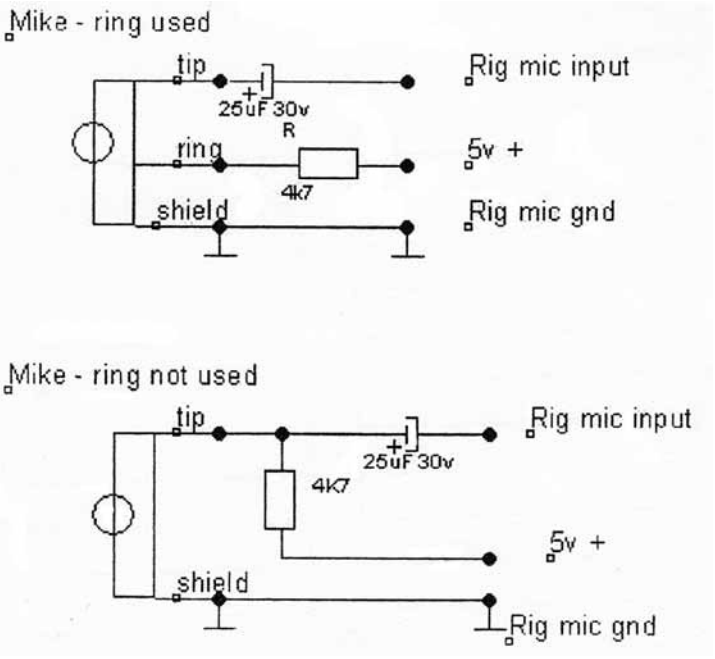
### Earphones

These can be plugged straight into the phones jack on your transceiver, you'll probably need to turn the volume up from its usual setting.

### Push to Talk

Bring the PTT line and ground out and connect with a push-to-make type switch.

Whether you are using a computer or manually logging, a headset is much more convenient, just make sure you don't put the mic in your cocoa. βi




◂ *continued from page 5*

### Further study using TCA Hotlinks

Further information is provided with TCA Hotlinks which are easily accessed via the RAC website. For this information, please visit <http:// www.rac.ca/tca>. Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The following hotlinks for this article are available on the RAC site.

***TCA Hotlink, 1*** Cebik (basic reference) <http://www.cebik.com/content/a10/wire/fdpl.html>

***TCA Hotlink, 2*** K4VX linear loaded dipole for 7 MHz <http://www.af2cw.com/license/dipole.pdf >

***TCA Hotlink, 3*** Linear loaded antenna with dimensions. <http://www.hamradiosecrets.com/short-ham-antennas.html>

***TCA Hotlink, 4*** The linear-loaded "Crappie" 40m rotatable dipole <http://www3.telus.net/va7st/rotary.htm>

***TCA Hotlink, 5*** The terminated folded dipole. Cebik <http://www.cebik.com/content/a10/wire/wbfd.html>

***TCA Hotlink, 6*** Cobra folded dipole antenna. <http://www.nonstop-systems.com/radio/frank_radio_antenna_cobra.htm>

***TCA Hotlink, 7*** An examination of the gamma match, W3PG. <http://www.bcpink.com/KB3IFH/files/Download/Gamma%20Match%20article.pdf>

***TCA Hotlink, 8*** The Slim Jim antenna, Cebik. <http://www.cebik.com/content/a10/vhf/sj.html>

Until later, Vy 73, βi

*David, VE3KL*

Next deadline for copy is
**10 November 2012**

# JBOT – An SSB linear amplifier made from Just a Bunch of Transistors

*by Ashhar Farhan VU2ESE*

*JBOT stands for "Just a Bunch of Transistors". It is a simple, stable and easy to build 5 watts linear amplifier build out of a bunch of ordinary low power NPN transistors.*

### Why another linear amp?

For many of us, getting hold of high power RF transistors is impossible. They are also expensive and easily blown. In the last decade, hams have pressed the power MoSFETs into use as RF devices. This has been a mixed success. The power FETs (mostly the IRF series from International Rectifiers) have very high input and output capacitance, they need higher drain voltage and they are very non-linear devices. As result, IRF device based RF power amplifiers have remained beyond easy replication for the average homebrewer.

Often, the RF power amplifiers are run flat-out without any attempt at stabilizing the performance, This has to lead to a lot of grief.

The BITX's linear amplifier painfully illustrates both these issues. The IRF510 takes a lot to get it going. Many of those who scratch build it on their own often found themselves struggling with stability and insufficient power output.

The inspiration from this power amplifier came from watching a colleague assemble an incredibly fast computer by adding together a number of ordinary hard disks and old mother boards. By stringing them all together, he was able to extract an amazing performance. When I asked him what kind of architecture this was, his reply was "It is JBOD (Just a bunch of disks)".

Paralleling transistors is not new to hams. I can recall an article by Doug (sk W1FB) in a 1970s *QST* where he had paralleled up six 2N3904s to generate a single watt of power. Harry's small linear amplifier pumped up to 23 dBm out of general purpose NPN transistors.

In this design, the attempt is to apply these principles to higher power output from the 2N2218 variety of transistors to get 5 watts of clean, stable and linear output from a 1milliwatt signal.

### What is JBOT?

JBOT stands for 'Just a Bunch of Transistors'. This linear replaces one big RF power device with a bunch of smaller, ordinary transistors.

a Each transistor handles less power, simple clip-on heat sinks are enough.

b Each output transistor has its own emitter degeneration, making the configuration very stable.

c Any general purpose NPN transistor rated for more than 500 mA current with metal can will work.

d The drivers are biased for higher than usual current to prevent saturation and good linearity.

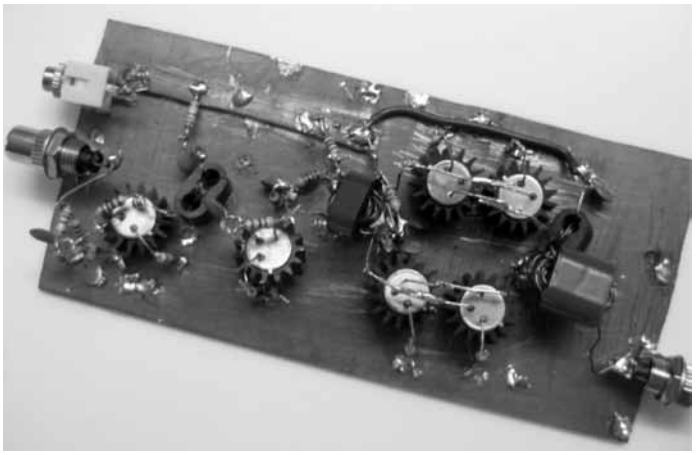
### Circuit Design

The circuit is a quite simple and straight forward three stage amplifier. The first stage is set to a collector current of 50 mA. This is on the higher side. It drives a trifilar transformer in the output.

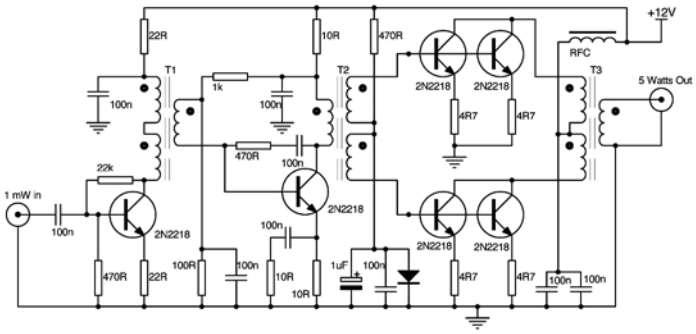
The second stage is biased for almost 100 mA of current. This helps preserve the signal linearity. The bias for the base is routed through the secondary of the T1. The T2 transformer is a little tricky, the primary winding is simple 10 turns while the secondary winding consists of 3 bifilar turns around the core. The secondary is wired such that it becomes a centre-tapped 3 + 3 turn winding.

The final stage uses four transistors in push-pull with two transistors on each side. Each transistor has a separate emitter degeneration resistor of 5 ohms. Each side is expected to push out 3 watts. This makes the output impedance of each side 25 ohms. The two sides in push-pull will add up their impedances and we will have 50 ohms across the primary winding of T3. The T3's primary consists of 5 bifilar turns (5 + 5 = a total of 10 turns). Against this, the T3 a secondary winding is normal 10 turns.

Though the circuit is stable and works well throughout the HF spectrum (I haven't measured it below 4 MHz and above 28 MHz), be careful of operating it without load. The 2N2218s cannot handle more than 30 volts across them, so never operate without a proper load.



*Note all transformers carefully (All windings are 26 SWG)*
*T1Trifilar winding on TV balun cores (or F37-43), 7 turns (7:7:7)*
*T2Primary 10 turns, secondary 3 turns bifilar (10:3:3) on TV balun core*
*T3Primary 5 turns bifilar. Secondary 10 turns (5:5:10); adjust secondary for best power. Use two TV baluns stacked and taped together, or 4 FT37-43 as two stacks of two each.*
*RFC10 turns on balun or FT37-43*




### Construction

For a change, nothing is critical in this power amp! The transformers need to be explained. Here goes;

T1: This is easy, it is a trifilar winding. If you imagine that the three wires of the transformer are A-B, C-D, and E-F. Then short B and C to make the centre tap. Use A and D as the opposing ends of the primary and use D-E as the secondary.

T2: First wind three turns of twisted, bifilar wire as the secondary. Over this, wind ten turns as the primary. Short the two opposing ends of separate bifilar windings as the center tap and use the remaining, opposite ends of the secondary as the outputs that go to the output transistor bases.

T3: The output transformer is constructed out of two TV baluns stacked and taped together. Alternatively, the core can be made by first stacking two FT 37-43 and forming a cylinder, then two such cylinders are held parallel to each other and taped tightly. This forms a 'double barrel' through which the windings are made.

All transistors have small clip on heat sinks. Check the picture.

Tip: The 5 ohms resistor on each of the transistors should show a little more than half a volt across it, if it doesn't you can assume it is blown. βi

*This article was kindly supplied by Jakey G3JKY/W9JKY/ZL2JKY*

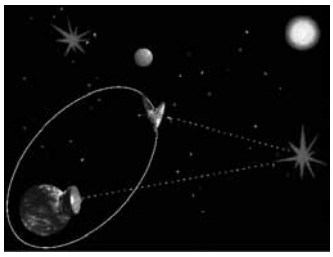
# What Do They Do with Those Big Dishes? – What is Radio Astronomy?

*by By John Andrews BSc ZL2HD©*

*"Like every science, Radio Astronomy, its results and techniques, serve the progress of other sciences in particular and humankind in general."[1]. I'd like to think the same could be written about amateur radio, and certainly the contribution to radio astronomy by radio amateurs would make such a statement in partly true! Many radio astronomers are radio amateurs and some of the early and most famous dishes were driven by people with call signs.*

So what are radio astronomers doing and what are some of the contributions they have made to science and society? The same article explains that words such as black hole, quasar and pulsar all are contributions of radio astronomy, and there are some very tangible technological benefits. One that is particularity interesting to radio amateurs is the progress made in low noise amplifiers. This (as well as enabling all sorts of great DX and EME at VHF and above) has enabled 3G cell phones, GPS and even helped with modern wi-fi standards. The techniques have been used in medicine in the areas of medical imaging and even radiation therapy to treat cancers. But what are they actually doing when they use this advanced technology to look out of the earth's atmosphere at wavelengths in the radio spectrum?

A well known example is the mapping of the cosmic microwave background (CMB). The big bang theory suggests that the radiation from the bang would still be visible, but due to expansion of space this would now be a very cool signal fairly evenly spread across the universe. In the 1960's this was found, which gave a very solid piece of evidence for the big bang theory and proof of the expansion of the universe. Further study in 1989-2000 found that the CMB was not uniform in all directions, but included small variations in intensity that are required in the first second of the universe to enable "clumping" of matter. If there was no variations, the universe would be an even mix of matter and space and galaxies and stars would not have formed (and we would not be here). Very sensitive measurements of the CMB by radio astronomers (Search for "COBE" and "Planck HFI" on the net) detected this "wobble" (really anisotropies, or differences in the direction you look) and added more evidence to the theories of the beginning of time.



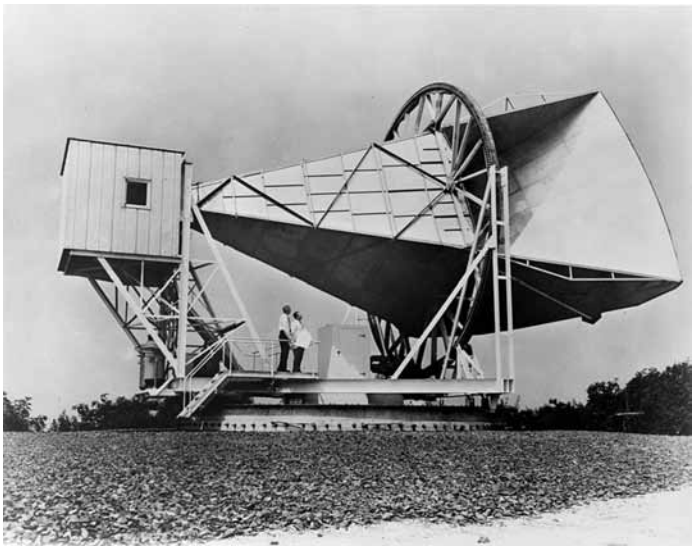
### Interferometry

This is the practice of making fine measurements using the interference pattern of two or more receivers. As when two antennas are put together in a phased array (such as stacked yagi's) the radiation pattern has many more peaks and nulls and they become finer (or sharper). So by knowing the new pattern of the set up we can use the system as a more detailed radio telescope. This can be used to map stars and star forming regions to a very fine detail. The gain of the system is the total gain of all the antennas, but the resolution relates to the total spread of the antenna array. It is these techniques that have helped finding planets orbiting stars at outrageous distances, to understand how matter is moving in star forming areas and around black holes, and this enables us to test out our theories on how our solar system and the planets formed. I guess it is better to have more than one star (our sun) to work with, and the more systems we get to see the better we can answer the questions. (or find new questions to try to answer). In many interferometry systems the signals are combined by a coax or other transmission line (even fibre optics if light interferometry is being done). But new timing and imaging techniques have allowed the receivers to be spread over great distances and the data assembled later using accurate time, strength and phase information. The has lead to Very Long Base Line Interferometry (VLBI), which uses receivers spread around the earth to form a large array. New Zealand and Australia are bidding to build an array known as the Square Kilometre Array (SKA) which will have many dishes spread over Australia and a couple in NZ to give the long baseline.

And while on VLBI, a new space based radio observatory has recently been commissioned , the RadioAstron satellite launched by Russia. This 10 m dish is not a huge dish, but its distance adds a lot to the VLBI project! During December 2011 the system was tested out on 6 cm and 18 cm sources that were observed both in space and at a number of ground radio telescopes to check the timing and phasing (and position) of the satellite.

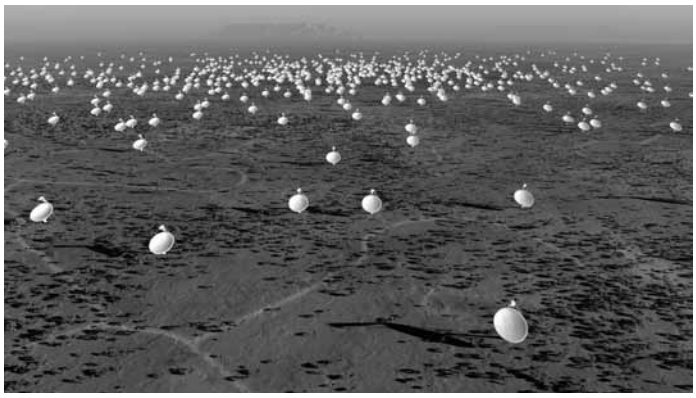
### Space Radar

Now this is a term that has a few meanings, so look out! Space radar can mean radar that is looking out

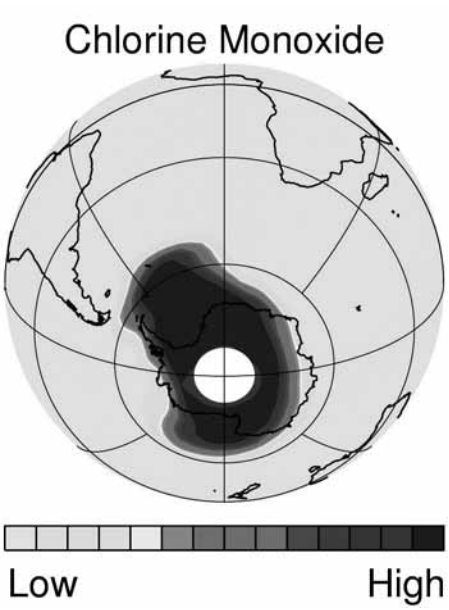


*The Holmdel Horn Antenna on which Penzias and Wilson discovered the cosmic microwave background. NASA image.*

*Very Large Array at Socorro, New Mexico, USA. Photo taken by Hajor, 8 August 2004.*



*Artist's impression of the SKA dishes. Credit: SPDO/TDP/DRAO/Swinburne Astronomy Productions.*




*Map of chlorine monoxide, the primary agent of ozone destruction in the Antarctic 'ozone hole,' as measured by the Microwave Limb Sounder instrument on NASA's Aura satellite at an altitude of approximately 18 km (11.2 miles) within the ozone layer. Image credit: NASA/JPL*

## Jamboree on the Air
### October 20 and 21 2012

For 55 years, the Jamborees on the Air (JOTA) have enabled scouts and guides all over the world to speak to each other with the assistance of amateur radio. Starting with a handful of scouts taking part in 1958, there was rapid growth, but it has slowed over the past several years. Combined with JOTI (Jamboree on the Internet) participation, which is now in its 16 year, something like about a million scouts and guides all over the world took part last year. New Zealand scouts and guides have benefited from participation in JOTA for over 40 years, and in JOTI since its inception. Some have had their interest whetted by this exposure and gone on to gain their own ham licences.

JOTA and JOTI are coordinated by the World Scout Bureau located in Geneva, and there are national organisers for them in each country in which there are scouts and guides. I have been New Zealand's National Organiser for the past 40 years. European national organisers have a triennial seminar, and I have had the pleasure and privilege of attending the past five of these. At the latest one held in Lisbon earlier this year, we saw every reason to aim for a significant increase of growth in the coming years. A target of attaining three million participants (ie, trebling the present participation) by the year 2015 was considered achievable and scout and guide associations in each country are asked to work towards this goal. I am certain that we in NZ can easily achieve more than a threefold increase in participation and I will be encouraging scouts and guides here to take part in JOTA, also in JOTI.

JOTA is an excellent activity for amateurs to help scouts and guides make friends all over the world, and to show youngsters what amateur radio can do. The experience could perhaps make radio amateurs of them. I ask you please to assist our scouts and guides to take part in JOTA this year. This year, the event is on the Saturday and Sunday of Labour Weekend, but operating may continue on the Monday so as to contact stations in the Pacific on the other side of the international date line.

*Jim Parnell ZL2APE National Organiser for JOTA and JOTI*

for objects in space such as a ICBM (nuke missile for youngsters), or a radar in space looking at enemy objects. We are not talking about those two. Another meaning and nowadays the main subject is radar on a satellite looking back at earth in order to do very accurate mapping of the earth surface. Accurate enough to detect bulging of the ground around an active volcano, the drift of the continental plates, and movement of slopes due to underground water.

But here I want to talk about sending a radar pulse out into space to measure things accurately or that we can't see well with optical telescopes. Following WWII military radars were used to measure distances to the planets and this helped establish their mass, orbits and other basic facts. At the same time they managed to measure asteroids and comets, which is still big business. Now there is a serious (and well funded) program to find all possible earth crossing asteroids and rate their danger using the Turino scale. Small things that might hit us get a low score, big things that will hit us get bigger numbers! The radio/radar astronomers can calculate orbits and mass and give a score. (Just so you can sleep tonight, there are currently no objects above 1 on the Turino Scale, which are small and might come our way). Interesting to note that large Arecibo dish can only send pulses as far as the gas giants, as the motion of the earth moves the receiver before the return signal completes it's journey. Bigger is not always better!

#### Atmospheric Research

The travel of radio waves through the atmosphere is subject that radio amateurs are very interested in, and it turns out that this science can also reveal much about earth's atmosphere. The discovery of the ozone hole[1] was found this way and is now carefully tracked. But there is much to be interested in the upper atmosphere and ground and satellite based radars and sounders can look at the composition and density, movement and heights of different layers and levels above us. The jet stream is monitored this way and this is leading to interesting theories that may or may not be attributed to global warming. The last two northern winters have been very cold due to disturbed jet stream around the polar vortex, and it will be interesting to see how the next winter is.

So, the science behind the technology that has been such a boon for the radio amateur and given us some great new technology, and lead to improved telecommunications, navigation and safety features such as GPS and SPOT beacons, 406 beacons and other things is also looking at the weather, the earth, the beginning of time, where did we come from and if we are alone. What a lot of things to do with a big dish! *βi*

#### References

[1] Committee on Radio Astronomy Frequencies Handbook for Radio Astronomy, p.20

[2] <http://neo.jpl.nasa.gov/torino_scale.html> This outlines the scale of hazard and chance of the event happening.

[3] Current work in this area is with the NASA Microwave Limb Sounder (MLS) Project

# IARU – International Amateur Radio Union

IARU Liasion Officer: John Lochhead ZL4QS
Liasion: Terry Carrell ZL3QL, Don Wallace ZL2TLL, Fred Johnson ZL2AMJ, Terry Thomas ZL4TAE, Stephen Hayman ZL1TPH, Edwin Musto ZL1BBO

The year is moving fast and Christmas is fast approaching. The IARU Committee has been busy preparing the papers for the 15th IARU Conference to be held in Vietnam and my thanks go to Terry ZL3QL for collating and editing and the papers in readiness for sending to Region 3. My thanks go to all amateurs who have been involved in this task.

The final list of papers is as follows:–

- New Zealand Amateur Band Planning and Licensing A 2012 Update
- Amendment of the Constitution of the International Amateur Radio Union Region 3. Increase in Number of Directors.
- The Christchurch Earthquake; 22 February 2011. A Report on Amateur Radio Involvement.
- KiwiSAT.
- Report from NZART. Amateur radio and public safety in New Zealand
- Report to Fifteenth IARU Region 3 conference. Response to the Report of the Directors to Member Societies in relation to Financial Matters

The Delegation from New Zealand is:

- Delegate John Lochhead ZL4QS
- Observer Don Wallace ZL2TLL
- Observer Terry Carrell ZL3QL

I can reassure the members that the team is very conscious of the cost of sending a delegation to Vietnam and I know they will do everything in their power to achieve a minimum cost to NZART.

It has been voiced on reflectors that the members of past delegations have just been on one big holiday. I can assure you all, as can past members of NZART 's previous delegations to IARU conferences, that the work load is very high and everyone is fully committed to giving their best.

The following was noted from a posting on the reflectors and it is good to see a little progress being made in this area.

### Broadcaster vacates 40 m amateur band

Radio Bangladesh has left 7105 kHz in the amateur 40 m band. They finished the experimental transmissions and are now using 7250 kHz. The move is thanks to the many amateur radio users who reported the infringement on the band. Particular thanks go to the German regulator BNetzA, who made official complaints to Radio Bangladesh.

### The IARU Region 3 Newsletter

Issue 26 – April to June 2012, Released July 2012

Work for The World Radiocommunication Conference 2015 has already commenced and working parties are already on the job. As usual meetings will be held by the regional groups over the next years, all of which will be combined in a coordinated presentation at WRC 2015. Final preparations for the Triennial Region 3 conference are under way. The major item on the agenda this time will be the financial situation in the region and the possible changes in subscription structure required to keep activities within the region at the same level at least.

A Word from the Chairman of IARU Region 3 Michael Owen VK3KI.

### The 15th IARU Region 3 Conference

I am sure we are now all very busy preparing for the 15th IARU Region 3 Conference in Ho Chi Minh City, Vietnam from the 5 to the 9 November 2012. I am sure that the host society, the Vietnam Amateur Radio Club, VARC, has been busy preparing for the Conference.

Please remember the theme the Directors suggest for the Conference (apart from the issue of finances) is emergency communications. The papers that are prepared and submitted set the business of the Conference, and so determine the value we get out of the Conference.

I have just written a letter to all member societies about the Conference setting out some of the changes the Directors have made for this Conference, and I would like to repeat here one of the points made in the letter.

The Directors looked at what lessons could be learned from our last Conference, the 14th IARU Region 3 Conference in Christchurch, New Zealand in October 2009. The cost of hiring photocopier machines and the cost of photocopying papers was a significant part of the cost of the Christchurch Conference. Another lesson from the Christchurch Conference was that with computer and intranet technology the reports for the final Plenary meetings were ready much sooner.

Obviously, the Directors have made minimizing costs and achieving efficiencies wherever possible a very important priority, and so the Directors have decided that the 15th Conference will, as far as possible, be a paperless conference. Of course, anyone requiring hard copy of documents or hard copy of a particular document, will be catered for.

We took advice from the NZART Organising Committee for the 14th Conference, who advised that we could do with substantially less photocopying equipment than was hired for the Christchurch Conference and that has been passed on to VARC.

But what I do want to stress is that we do urge all participants in the 15th Conference to make sure that they bring their computers with them to Ho Chi Minh City. In today's world we don't need to destroy a forest to run a Region 3 Conference.

9V1UV Selva's Special Fund. It may be recalled the former Director 9V1UV OM Selva had made a generous contribution of US$ 5000.00 to be used by the Directors for special projects. No formal guidelines were made for utilizing this fund.

We have not received any requests from any society for a contribution from this fund so far. Considering that the entire club station of RAST was destroyed by flood, the directors have decided to make a contribution of US$1000.00 to RAST from Selva's fund to help rebuild the station and more particularly towards the cost of a tower and antenna to be erected at a new location they have decided upon.

### Silent key

- ***Richard "Dick" Baldwin*** W1RU

Richard "Dick" Baldwin, W1RU, of Damariscotta, Maine, passed away on Thursday, June 21, after a long struggle with Parkinson's Disease. He was 92. An ARRL Charter Life Member, Baldwin capped a long career on the ARRL staff with service as General Manager from 1975 until his retirement in 1982. He served as Secretary of the International Amateur Radio Union (IARU) from 1976-1982. After retirement, he continued his involvement as a volunteer, serving as IARU President from 1982-1999 and as ARRL International Affairs Vice President from 1982-1986.

IARU President Tim Ellam VE6SH said "Dick was instrumental in securing new HF allocations at 10, 18 and 24 MHz during WARC-79. He was a key figure in the work of the IARU, and the Amateur Radio Service is in a better place today because of his leadership."

### Work of ITU-R for WRC-15

Work was begun at Working Party 5A (WP 5A), which is the responsible group on WRC-15 Agenda item 1.4 (to consider possible new allocation to the amateur service on a secondary basis within the band 5 250-5 450 kHz in accordance with Resolution 649 (WRC 12)), from 22-31 May 2012 in Geneva, chaired by José Costa (Canada). Amateur Services is handled at Working Group 1 of the Party, chaired by Brennan Price (USA)

A work plan and milestones for the agenda item were adopted. The following two working documents toward preliminary draft new Reports on compatibility and spectrum occupancy were drafted based on the contributions from Canada and US.

- a preliminary draft new Report ITU-R M.[AMATEUR] - Compatibility analysis of possible amateur systems with fixed, land mobile and maritime mobile services in the frequency band 5 250-5 450 kHz
- a preliminary draft new Report ITU-R M.[HF SPECTRAL OCCUPANCY] – Spectral occupancy of fixed and mobile allocations within the band 5 250-5 450 kHz

# 30m QRSS Beacon Transmitter

*by Gilbert Best ZL3UJZ*

*With the currency exchange rate at a reasonable 1 British pound for approximately NZ$2 I splashed out and ordered a kitset QRSS Beacon Transmitter from Hans Summers G0UPL[1] This beacon uses FFSK to transmit the operator's call-sign repeatedly at very slow speeds (QRSS). Hans and his offsider, Stephen Farthing G0XAR, have created beacon transmitter kits that are suitable for use on 80, 40 and 30m. They have set up an online shop which takes the order for the beacon band of your choice. From there a microcontroller, the Atmel ATTINY13, is programmed with your call-sign for use within the beacon.*

The beacon contains no surface mount parts and does not require any further programming of the micro on the operator's part. The kit (Fig ) consists of an instruction sheet printed on both sides of an A4 sheet of paper, PCB 64x51mm, five toroids that are wound by the constructor, enamelled copper wire, a crystal for the band of interest, and all other components except connectors. An enclosure is not supplied. Also supplied is the pre-programmed microcontroller and an eight pin IC socket.

Construction is fairly straightforward. The only component that requires special attention is the trimpot which needs to have its 'top' and ground pins extended with offcuts of resistor legs in order to be installed. There is enough copper wire supplied to wind all five toroids with a few spare centimetres left over.

The micro is the first component to be tested soon after its installation. The oscillator and buffer components are then installed and tested using either a frequency meter, or a receiver that covers the band of interest. The remaining components are installed so that the board is fully populated.

There are four adjustable components on the PCB that allow control over the operating frequency, the power level, wpm selection, amount of frequency shift. Here the beacon has been set to use 6 second dots and then after circuit operation had been verified, the PCB was placed into a suitable metal enclosure :

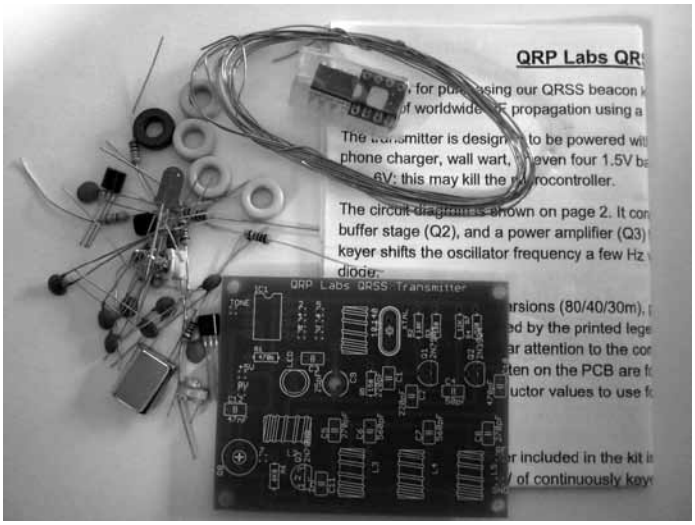
Once the beacon is powered up it transmits the call-sign once at 12 wpm, but from then on it transmits at the speed selected by the operator. One interesting aspect of QRSS is that monitoring of the transmitted signal can be done by accessing the internet and observing any number of online QRSS 'grabbers'. Peter Mulhare ZL2iK usually has one such grabber[2] tuned to 10.140 MHz and Fig shows the received QRSS representation of my own call-sign as received at his QTH.

So, the distance from beacon QTH to the grabber QTH is approximately 1000 km, and because the grabber has detected the QRP signal, we can be reasonably sure of an open communications path on 30m across that distance.

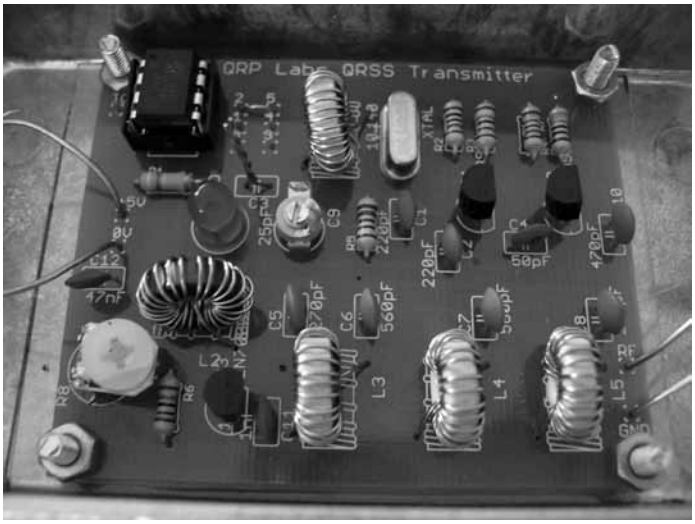
Total construction time including the enclosure preparation was about three hours. This type of project might just be suitable in a Buildathon for current Hams who are keen to delve into some construction.

Future plans at this QTH are to modify the beacon for use on 10m. In addition to the beacon kits Hans' shop also supplies 28.000 MHz crystals, so there is certainly room for experimentation.

Thanks to ZL2iK for kindly allowing reproduction of his grabber's output, and to G0UPL for his permission to reproduce images of the beacon kit. βi



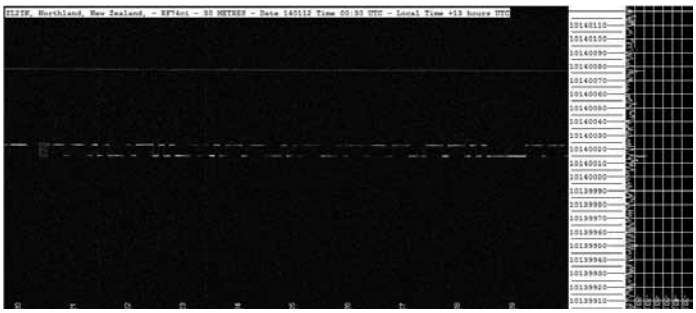

*30m QRSS beacon, kit of parts.*




*30m QRSS beacon, populated PCB.*

**References**

[1]<http://www.hanssummers.com/qrsskit.html>
[2]<http://www.igrin.co.nz/~peter/Grabber.htm>



*ZL2iK online QRSS grabber output.*

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The Korean Communication Commission (similar to US FCC) formed an Official Team for the preparation of WRC-15, and has started the series of meetings. Region 3 director Prof Rhee is one of the government delegates which take care of Agenda 1.4.

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Next deadline for copy is
**10 November 2012**

# Working the big satellite

*by Andrew Barron ZL3DW* <zl3dw@nzart.org.nz>

*The biggest and arguably most challenging satellite for amateur radio operators to use for ham QSOs is the largest by a wide margin and it also has the highest orbit. Yes of course, I am talking about the moon and the mode is called 'moon bounce' or more commonly 'EME' (Earth – Moon – Earth). I am definitely no expert on the subject having, to date a single confirmed 2m band EME QSO with RX1AS a 'big gun' EME station in St Petersburg, Russia. But since there has not been a Break-In article dedicated to EME for a while, I thought I would write a general interest article on the topic. If I get something wrong, don't complain... write something better.*

In January 1944, German technicians were surprised to see echoes with around a 2.5 second delay while testing an experimental 120 kW Radar station operating on 564 MHz. The station, code named 'Würzmann', was located on Rügen island (Göhren) on the shore of Baltic sea, (locator JO64UI). They had inadvertently beamed the collinear antenna array at the rising moon. When the moon passed out of the antenna lobe, the signal disappeared. The technicians repeated the experience the following evening. They were seeing the first known radio echoes from the moon. The "moon bounce" technique was developed for military and commercial use by the United States Military in the years after World War II, with the first successful reception of echoes off the Moon being carried out at Fort Monmouth, New Jersey on January 10, 1946 by John H. DeWitt as part of Project Diana. The Communication Moon Relay project that followed led to more practical uses, including a teletype link between the naval base at Pearl Harbour, Hawaii and United States Navy headquarters in Washington, DC.

The first amateur radio echoes from the moon were sent and received on the 2m band by Ross Bateman W4AO, and Bill Smith W3GKP in July 15, 1950. But it was not until July 17 1960 that the first trans-USA EME ham QSO was made, from California to Massachusetts via the moon on 1296 MHz, using a 1 kW transmitter and 18 foot dishes. Four days later signal reports were exchanged both ways marking the first two way EME ham QSO.

The moon is a very long way away and is not a particularly good radio reflector because the moon is spherical and the surface is rocky and irregular. As a radio reflector, the moon is only about 7% as good as a flat reflector the same radius would be. This means that the signals received back from the moon over the 770 000 km average return path distance, are very weak indeed. The received signals are fluttery and distorted by effects including; multiple reflections from the moon's curved surface, path loss, heat noise, ducting and fading in the Earth's atmosphere, and Faraday rotation which alters the polarisation of the radio signal. The next best extraterrestrial object for echo purposes is Venus; five minutes round-trip time and roughly a million times more difficult to detect reflected signals from than the moon. However, this has already been done by hams using the 20 m dish at Bochum in Germany with a transmit signal of 5 kW on the 2.4 GHz band. Not your average ham station!

The typical path loss on an EME path is around 250 to 310 dB depending on the VHF-UHF band used. To overcome the path loss, you need high gain antennas (preferably 15 dB plus) and reasonable power levels (100 W to 1 kW). You also need to radiate a signal that is not going to be bent back to Earth by the Ionosphere. For these reasons EME is restricted to the VHF, UHF and microwave bands. Most activity is on 2 m with significant activity on 6 m and 70 cm, and some activity on the ham bands up to 10 GHz.

Because of the signal distortion and weak signals received, almost all EME QSOs are conducted using CW or now more commonly the JT65 weak signal mode developed by Joe Taylor K1JT. JT65 is one of the digital modes included in the WSJT software package that Joe makes available for free, at; <http://physics.princeton.edu/pulsar/K1JT>. SSB is not commonly used for EME QSOs because of the extremely weak signals, and flutter, noise and distortion on the received signals and is often only possible between 'big gun' stations running very large antenna arrays or dishes and high power. However, sometimes short SSB or CW contacts are made after the JT65 QSO has been conducted, especially if very strong signals were noted in both directions. The WSJT software is extremely effective in very weak signal conditions and has opened up EME and modes like meteor scatter to hundreds of hams with modest stations and aerial systems. It is possible, but not easy, to work EME using a single 12 element 2 m Yagi and 100 W, especially if the station at the other end has a 4 or 6 antenna array.

To quote the WSJT operating manual, "WSJT is a computer program for amateur VHF/UHF communication using state of the art digital techniques. It can help you to make contacts using fraction-of-a-second signals reflected from meteor trails, as well as steady signals more than 10 dB weaker than those needed for conventional CW. The software includes several operating modes; FSK441, designed for high speed meteor scatter, JT6M, optimized for meteor and ionospheric scatter on 6 m, JT65A, B and C for Earth-Moon-Earth (EME) and weak troposcatter and CW for EME using timed, computer-generated transmissions". "JT65A is generally used on 50 MHz and for HF band non EME contacts, JT65B is used on 144 and 432 MHz, and JT65C on the 1296 MHz band and above. The B and C JT65 modes are slightly less sensitive than mode A, but progressively more tolerant of frequency drifts and rapid libration fading".

When you use JT65 your station transmits continuously for 60 seconds and then receives for the following 60 seconds (times depend on the JT65 mode). During each period a maximum of around 20 characters of text information can be sent, so the information you send in an EME QSO is kept to an absolute minimum. A typical initial transmission might contain 'CQ', your call-sign and Maidenhead grid. The response would be your call-sign, the answering station's call-sign and their grid. In the following over you would send the signal report which is always 'O' (normally sent three times as OOO), the other station will respond by sending 'RO' which means I have seen your O report and respond with an O report for you. You normally go back with 'RRR' meaning I have received your report thanks, and they finish the QSO by sending '73'. So in an EME QSO the signal report on your QSL card is always 'O', rather than the 59 / 599 type of report used for other types of ham contacts.

Unlike satellite operation, you don't really need elevation control on your Yagi antennas for 2m EME. This is because for the longest distance between points on the Earth's surface the moon needs to be at low elevation. Most EME activity takes place at local moon rise and moon set. Another important factor is 'ground gain'. This is the effect when a signal reflected from the ground adds to the direct signal. The signal improvement can reach a theoretical maximum of 6 dB and because of the phase relationship on the reflected and direct path will occur at a measurable elevation, or at several elevations with deep nulls between. If the station Yagi is placed at a height at which the main antenna lobe coincides with a ground gain enhancement the signal as the moon passes through the right elevation will be improved. Using an antenna elevated to point at the moon when it is higher in the sky extends the time that EME operation can occur, but you don't get the added ground gain. Ground gain gives a much needed boost to the receive signal on the 6m and 2m bands, but because the earth is a relatively hot body the additional noise received impairs the signal improvement on 70 cm and above.

You can try EME with a medium size satellite or VHF DX station say 10

# Monitoring Service

Monitoring Service Co-ordinator: John Martin ZL1GWE
<john.martin@nz1.ibm.com>

Greetings to all, including Short Wave Listeners and contributors. A few months on, winter has now finished and spring is upon us. 160 metre and 80 metre opportunities arise on the lower HF bands.

I have commenced a HF Noise Campaign within New Zealand to complement the one initiated within the United Kingdom. The idea is to collate local band ground noise from your location, using the same receiver/transceiver and aerial. Those who are interested in participating, please contact me for a reporting spreadsheet. The basic idea is to choose once a month a particular frequency, day and time per HF band and provide a signal report either using an S-meter or in dBm (which is generally more accurate). Reports will be called for every six months during August and February. These will be collated per band per month and pulled together into a report to provide evidential information on the increase or decrease in background noise. The report will also be compared with the ITU-R suggested background noise levels.

This information may prove to be useful for many reasons. It has been a very busy couple of months, having to put aside many weekends and annual leave to concentrate on professional certification and to maintain ones personal circumstances given the economic situation at the present time. Putting that aside, some contributors are now providing reports regularly using the Monitoring Service reporting spreadsheet, which is available from the NZART web site or directly from me upon request. The collation of reports, like this, even for five minutes a day, means that some good samples are collected throughout the month and enhance our reporting capability; we need more people willing to do this please.

At present, I am plagued with a noise source, outside of the QTH (location), which I plan to locate and raise a complaint about or rectify. It appears to be centred on 3.25 MHz and has outbreaks on 3.52 MHz and 3.90 MHZ. Has any one seen anything similar to this?

Note the background noise level at -146 dBm above -150 dBm base line and multiple signals, which never go away, even when there appears to be no signal there at all.

For those wondering, if Tiger OTHR (Over the Horizon Radar) still exists within New Zealand on 30 m, here is a snapshot indicating that both the Australian and New Zealand SuperDARN systems are very much alive and kicking outside of the AR allocation.

**Note:** OTHR on either side of the 30 m allocation. JORN type OTHR on the lower side with its characteristic pip at the commencement of the transmission. The Tiger OTHR has its own characteristic signature above 10.150 MHz. The HF Man Packs are also relatively easy to spot, just sit on a frequency in the middle of a nominated band i.e. 20 m, 80 m or even 40 m, with the receive in the background with a LSB or USB bandwidth and you will soon hear the characteristic "Shush, shush, shush, shush, shush, shush, shush, shush" of a 8-PSK pulse transmission or sometimes a 6-PSK transmission. The source has been identified as being North of New Zealand, so further reports are most welcome.

**Intruder System Observer League Table 2012**

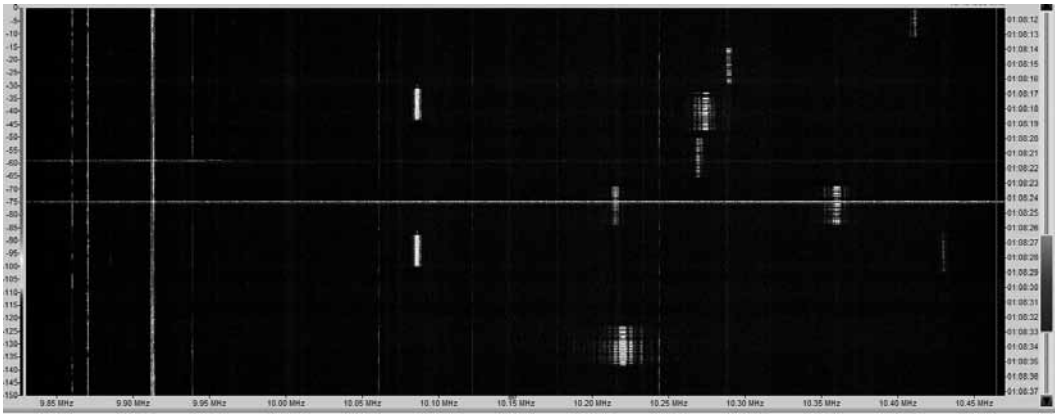
*(Up to end of August 2012)*

| Contributor Name / Call-sign | Number of verified reports |
|---|---|
| John ZL1GWE | 800 |
| Bob ZL1BAD | 259 |
| Stephen ZL1TPH | 119 |
| Phillip ZL2TZE | 43 |
| Brett, ex VR2BG/P | 36 |
| Rex ZL4IV | 4 |
| Gary ZL2iFB | 5 |
| David ZL1DGK | 3 |
| Dallas NZRDXL | 2 |
| Bill ZL3NB | 1 |
| ZL2AAA | 1 |
| Others | 0 |

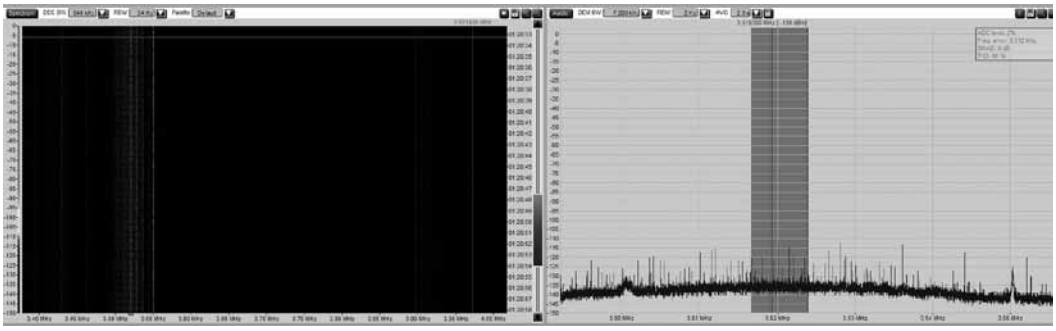
Some additional pointers will be provided in the next edition. Please report intruders to: <MS@NZART.org.nz> or <MS2@NZART.org.nz> or <IntruderWatch@GoogleGroups.com> or to your favourite DX Cluster.

If you have any questions, do not hesitate to contact me directly.

*John (ZL1GWE)*



*State of the 30m band: snapshot on 8 September 2012 at 0111z.*



*John ZL1GWE's local noise source. It appears to be centred on 3.25 MHz and has outbreaks on 3.52 MHz and 3.90 MHZ. Has any one seen anything similar to this?*

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-12 elements on 2 m. Load up WSJT point your antenna at the Moon and see if you can decode any signals! But to avoid hours of frustration I recommend that you seek help from a local EME expert before trying to transmit. 2 m activity is at the low end of the band, just above 144.1 You can find out who is transmitting, their frequency and period (1 or 2), and an idea of their setup, by looking at the N0UK logger <http://www.chris.org/cgi-bin/jt65emeA>. For example (K6MYC/4XP32/KW) means K6MYC is using four cross polarised 32 element Yagis and 1 kW of power.

I hope this article gives you a taste of the EME world, it is not for the faint hearted and you do need a great deal of skill and patience. Some days the signals are weak or there is too much distortion, or fading and it just does not work, other days it is really exciting. βi

# Powering your Shack "off the Grid"

*by Phil Slater ZL2OWL*

*At a recent Branch 42 meeting we had interesting 'brainstorming' session about powering ham shacks 'off the grid'; a situation we, as radio amateurs, would likely face in the event of a protracted widespread electricity grid power supply disruption.*

By way of background, it is entirely possible that a widespread protracted grid disruption could entail loss of 'regular' public communications such as cellular networks and phones. The networks would eventually lose battery backup power at cell sites and, for most people, hand phones would not be able to be charged at home. Cordless home phones connected to the fixed wired Public Switched Telephone Network (PSTN) would not work as their base-station units need mains power and their hand sets rely on batteries being charged. Hard-wired conventional phones may continue to work as they take their power from a central battery at the local telephone exchange, in the larger exchanges there are backup engine alternator sets to keep the 50 volt central batteries charged up.

Emergency-services phone calls to '111' might still be available over the PSTN via a conventional (hard-wired) phone; presuming that other elements of the emergency services systems are working.

Broadcast radio systems may mostly continue, albeit at reduced power, as major transmitter sites have emergency backup central batteries and engine alternator sets. Home radio broadcast receivers dependent on mains electricity would not function, but battery operated broadcast receivers could function; depending, of course, on the availability and condition of the necessary batteries.

Electricity grids are susceptible to disruption for a variety of reasons which we won't delve into here: suffice to say that, contrary to popular belief, major grid disruptions could occur even without the trigger of a dramatic geological catastrophe such as an earthquake, or a wild-weather event. Even if an earthquake or wild-weather event was the trigger for a widespread grid disruption, beyond the geographic area of actual discernible physical damage no physical disarray would be apparent. There'd 'just' be the loss of grid electricity, and inevitable unpleasant knock-on consequences.

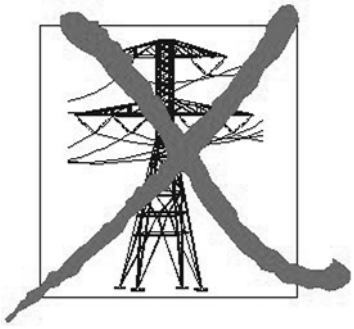
In the event of widespread medium or long-term grid failure, even in the absence of physical disarray, society could be expected to quickly begin to break down, driven by failure of key utilities, supplies and services, plus consequential breakdown of law and order.

In such circumstances amateur radio (especially HF, VHF and UHF, with multiple operating modes) can be a lifeline for emergency services. Such has proven, time and again, to be the case in past emergency situations around the world. *BUT*, and this is a very big but, only if emergency communication (EmComm) power supplies are available at amateur station sites; meaning, among other things, our shacks. Even if you and yours are OK, even if you know how to handle your ham radio role in an emergency, even if your shack and antennas are intact, your shack radios are useless unless you've got power. It follows that the key concept here is 'energy storage' that will cover a significant period of time, which could range from hours, to days; even in a 'worst case' weeks or months of operation off the grid! That means prior planning and provision for EmComm shack power supplies.

So what are, or might be, your EmComm shack power options? Following, in alphabetical order (not in any order of practicality or preference) are EmComm shack power supply possibilities that emerged from the brainstorming:

- Automotive, marine, deep-cycle, or similar batteries;
- Gel cells, SLA batteries;
- Generator sets (gas powered – LPG etc);
- Generator sets (petrol or diesel);
- Solar panels;
- Wind generators;
- Micro-hydro (for the lucky few).

The above suggestions raise more



questions than answers. For instance; batteries of any type need some form of charging (presuming they're not single-use throwaways) when they become exhausted. So whilst they're a temporary solution, without recharging sooner or later they're bound to become discharged and useless.

It follows that as radio hams and potential emergency communication providers, in the event of widespread grid power 'blackout' powering our shacks off the grid is a challenge that we should be prepared for. When other forms of grid dependent electronic communications fail ham radio (particularly HF radio, because of its over-the-horizon point-to-point capabilities) is still likely to work, but there's an important caveat; only if prior and proven planning has been done. Key words here are prior, meaning before grid failure, and proven, meaning in place, tested, and workable. It's somewhat late in the day to start thinking about EmComm power supplies after the grid has failed. The time-proven (often overlooked, sometimes complacently ignored) engineering adage, 'expect the unexpected', is a certainly a truism so far as amateur radio emergency radio communications are concerned. Either invest in prior planning, preparation and practice, or risk falling short when the chips are down and radio competencies are desperately needed in a grid blackout situation.

Realise that protracted grid failure would likely disable much of today's taken-for-granted public service (government and non-government) infrastructures. Vital necessities of modern daily lives including communications, emergency services, money and banking (including the 'plastic fantastic' cards most of us today depend on), food, fuel, law and order, medical services, transport, water supplies, sanitation and so forth, all rely, directly or indirectly, on grid electricity and are therefore vulnerable.

In the event of grid failure, provided your QTH is intact, or at least not in such a state of confusion or unpreparedness that operating is not possible or is unsafe; provided you have prepared and practiced ahead, you should be able, as required, to contribute to emergency radio communications. This implies prior attention to 'five Ps' – specifically, Personal Preservation; Paraphernalia; Power Supplies; Procedures; Practice and Proof. These are essentials for anything more than brief (meaning not more than a few hours to one or two days) off grid survival and operation.

1. **Personal Preservation**. You'll need essential supplies and arrangements, including potable water, food, clothing, medical supplies, fuel (cooking, heating, transportation etc), lighting, hygiene arrangements, battery-powered broadcast receiving arrangements, money (plastic card payment and cash withdrawal systems, and internet banking, will be early casualties of protracted grid failure), pre-defined local community network/s, security, and so forth. Don't forget provision for domestic animals (pets). You'll need sufficient provisions to outlast the duration of any possible grid-power failure, which (as mentioned earlier) in an extreme situation could stretch out for weeks or, worst case scenario, months; at least until some form of power is restored and normality begins to return; or until outside help is available. The few day's emergency water and rations recommended by many emergency management advisories, while better than nothing, would be totally inadequate in the event of a major widespread grid failure, when prompt external aid may not be forthcoming. Without adequate prior preparations you and yours

could rapidly become victims – part of the wider problem, rather than part of the solution.

2. **Paraphernalia**. Shack equipment you'll need includes transceivers, antennas, accessories, lighting, tools, manuals, spares, and safety equipment. You'll also need stand-alone power supplies.
3. **Power Supplies**. As identified earlier, there is a range of possible off-grid power supply possibilities. What you'll need depends on the total power requirements of your station (as well as any non-shack domestic essentials), and the possible duration of grid disruption you're contemplating.
4. **Procedures**. Message handling, operating protocols, network procedures, personal capabilities and know-how; this includes knowing how to minimise transmission times and make conservative use of power-consuming equipment in order to maximise the value from limited power supplies.
5. **Practice and Proof**. Prior practice and preparation are never wasted.

Now let's focus on items 2 and 3 – Paraphernalia (meaning shack equipment), and off grid Power Supplies. These two items mean all the power consuming radio and allied equipment and accessories (e.g. lighting) you'll need to operate your shack. Plus how much power you'll need to operate your gear, and where that power might come from.

**Paraphernalia** (shack equipment). For EmComms, at a minimum you'll need a transceiver (or transceivers) and peripheral equipment to cover the frequency ranges and modes you're likely to use. Let's say this means HF, VHF and UHF capabilities. Transceivers could range from all in one 'shack in a box' to separate HF and UHF/VHF rigs; your choice. You'll need efficient antennas, ideally meaning resonant antennas for your intended operating frequencies. Inefficient antennas are power wasters, needing some kind of tuner to fool the radio. Many separate non-manual autotuners need their own power cable and supply. You should also have suitably powered broadcast radio and/or TV receivers available for news reception and monitoring purposes. You're going to need some kind of lighting, maybe using high-efficiency fluorescent or LED lighting, –readily available today at modest cost. Candles, kerosene lanterns and suchlike should only be considered as an absolute last resort, they are serious fire hazards; more so in the possible presence of hydrogen gas emissions (from lead acid batteries) or flammable fumes from liquid or gaseous fuels. A shack fire is never a good look, emergency situation or otherwise – a suitably rated fire extinguisher is always a smart idea. Be sure to pre-test AC or DC powered emergency lighting arrangements for RFI by doing a thorough frequency sweep, some energy-efficient lighting is diabolical from an RFI perspective and should be avoided.

Depending on equipment and modes you intend to use you may need to power a computer but, in the widespread absence of grid power, don't count on internet access. Computer use has implications not only for your EmComm power requirements, but also for the quality of your emergency power supplies. Many computers (as well as other sensitive electronics, including some AC powered modern transceivers) don't like modified sine wave (MSW) AC power supplies. And the output of some so-called pure sine wave (PSW) inverters is less pure than others and may also cause sensitive electronics to 'spit the dummy'; pre-testing is important.

**Power Supplies**. Off grid power supply arrangements involve a somewhat complex range of considerations and choices, including:

- Length of off-grid time you're planning for;
- Specific equipment you're likely to use;

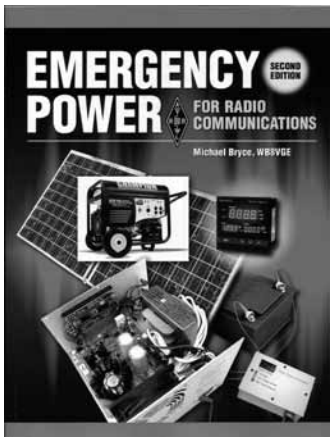
- Estimated duty cycles for each item of equipment and, in the case of transmitters, power output levels and modes – these will affect your power supply requirements. A sensible power saving guide is to use the minimum power output that will do the job – QRP rather than QRO.

Earlier we identified seven possible power sources for grid-blackout situations. Some of these are more practical than others for lengthy power disruptions. Entering a grid failure situation with fully-charged standby battery supplies, but no means of recharging when batteries become exhausted, can only be a short-term palliative. Diesel, petrol or gas powered generators or automotive alternators for recharging, or as direct sources of low voltage DC or inverted mains voltage AC, can only work as long as fuel supplies last. In a widespread protracted grid disruption it's a certainty that most fuel resellers will rapidly and involuntarily cease trading – among other things they depend on grid power for pumping and payment purposes. Long term storage of petrol or diesel for emergencies is not, for most of us seriously practical. The quality of stored petrol and diesel is prone to deteriorate over time, particularly if stored in less than ideal conditions. After a few months stored fuel can become 'stale'; meaning near useless (especially for starting) internal combustion engines. Hint: keep a can or two of engine starter spray in reserve; it might just save the day with stale fuel. Aside from fuel storage problems, local ordinances and property insurance terms and conditions are very likely to frown on storage of anything more than very modest quantities of flammables…other than in the fuel tanks of vehicles. The trick here is to always keep your tanks topped up and a siphon handy: provided, of course, that your vehicle fuel is compatible with whatever else you're intending to use; diesel into petrol or vice versa doesn't go!

We're left with the most likely longer-term options of several forms of stand-alone renewables; in particular solar and wind. In combination with the necessary controllers, batteries and, if required, PSW inverters for AC supplies, we can have medium/long term off-the-grid shack power. Not necessarily cheap or easy to set up, but certainly do-able, and invaluable forms of longer-term emergency power supply insurance.

Where to from here? *Emergency Power for Radio Communications* by Michael Bryce, WB8VGE (second edition, ISBN978-0-87259-615-3, published by the American Radio Relay League, Inc (ARRL), has emerged as the oracle on such matters, covering the complexities of EmComm power in informative, comprehensive, readable, practical and, most importantly, doable detail. Available from the ARRL publications and online store <www.arrl.org/arrl-store>. WB8VGE's guide is highly recommended; much too useful to lend and risk having it nicked! So don't ask to borrow mine. Shout yourself a copy and put it right on top of your shack reading, reference and action stack. βi

*Phil Slater ZL2OWL*

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# Amateur Radio Westfest 2012

*by Barry Johnson ZL2BAZ*

*Westfest 2012 was held over the weekend of 25 and 26t August in the gymnasium of the Murchison Area School. Participants started arriving from about 9am on the Saturday morning. It was great to meet up with amateurs from other areas as far South as Ashburton. From about 9.45am onwards a cup of tea/coffee was served accompanied by (thanks to Topsy ZL2LS) freshly baked scones complete with strawberry jam.*

At 10.30am after a brief introduction and welcome to some 34 attendees by Bob McQuarrie ZL3TY the morning session of presentations commenced. Jim Meachen ZL2BHF from Nelson Branch gave a PowerPoint presentation covering his recent work assignment with Sky Television in Auckland associated with the recent London 2012 Olympics coverage. Jim's presentation included some of the drawing and action pictures of the broadcasting facilities involved in an operation that was the biggest individual event in Sky Television's history.

Andrew Barron ZL3DW from Christchurch then gave a PowerPoint presentation covering SDR (Software Defined Radio). Andrew's presentation included the Flex Radio 1500, a low-cost, low-power SDR that is positioned to allow ham radio operators the ability to experience the incredible capabilities and fun of operating an SDR without breaking the budget. The Flex Radio 1500 has a maximum output of 5 watts and operates between 10 kHz and 54 MHz.

At 12.30 the morning session concluded and attendees went their various ways to have a bite of lunch. The afternoon session with 37 in attendance commenced at 1.30pm with Mark Sullivan ZL3AB from Christchurch giving a Bluffers Guide to HF Propagation PowerPoint presentation. Mark mentioned that in 1901 Marconi was the first to use propagation, but it was in 1902 that two physicists; Heaviside and Kennelly, came to the conclusion that there was an electrically conducting layer in the atmosphere. Mark then went on to explain the different characteristics of layers D, E, F.

Simon Lewis ZL4PLM from Christchurch gave a PowerPoint presentation covering the Building of High Performance VHF and UHF Yagi's. His presentation included photos of Yagi's that he had built, the characteristics of different Yagi designs and what to look for in Yagi design specifications to best meet your required criteria. Simon uses and recommended the DK7ZB's design program to design Yagis.

3:00 pm was afternoon tea time and after 30 minutes or so it was back to Simon Lewis ZL4PLM who gave a PowerPoint presentation covering the building of high power solid state amplifiers for 2 m and 70 cm. This presentation included photos and circuit diagrams of Jim Klitzing W6PQL's amplifier design which uses two LDMOS (Laterally Diffused Metal Oxide Semiconductors). This amplifier design produces 1200 W output from 4 W drive and requires a power supply of 50 V at 30 A. It is 75% efficient and has the ability for an antenna mismatch of 65: 1.

Barry Davenport ZL2LN from Motueka Branch presented a practical demonstration of running a QRP HF radio on organic batteries. Barry's first demonstration used eight small pill bottles half full of Watties® tomato sauce, with a strip of copper and an old small galvanised spring as the electrodes in each pill bottle. This battery produced approx six volts without a load. Barry then demonstrated using eight lemons and copper strips and galvanised nails as the electrodes which produced approx 7.25 volts without a load. Both of the batteries ran the QRP radio for a short time.

Saturday's afternoon session finished at 5:00 pm. A number of us went to local café for an evening meal and then across the road to the Hampden Pub for drinks and to watch the All Blacks beat the Aussie's.

From about 9 am on Sunday morning people started arriving at the school and we enjoyed drinking tea and coffee and having a jolly good chin wag. At 10am with 34 persons in attendance the Sunday Session commenced. Dave Brown ZL3FJ from Christchurch led the way with a PowerPoint presentation covering Time Domain Reflectometry (TDR). Dave's presentation defined TDR and demonstrated the electronic instrument used to characterise and locate faults in metallic cables (for example, twisted pairs, coaxial cables) It can also be used to locate discontinuities in a connector, printed circuit board, or any other electrical path. The equivalent device for optical fiber is an optical time-domain reflectometer.

Andrew Barron ZL3DW from Christchurch gave a PowerPoint presentation titled "How to Stick Pins in an Electronic Map." Andrews's presentation included software that he had written to plot ham QSOs as pins on the Google Earth™ map of the Earth. You could see where your QSOs or QSLs had come from as the Earth spins slowly on your PC screen. For more information, <www.qsl.net/zl3dw>

Barry Davenport ZL2LN from Motueka Branch gave a presentation on how to convert old computer switch mode power supplies to amateur radio use. Barry's presentation explained how he rewound the power transformer, modifications to the circuit board and some very important safety issues to consider while converting these power supplies. Barry recommended using Seven team® Electronics computer power supplies with details of conversion at <www.users.on.net/~endsodds/smps.htm>

David Scott ZL2BCA from Nelson Branch gave a PowerPoint presentation titled "Saddle Hill - Solar Power" it included slides of voltage and temperature graphs as recorded from the Saddle Hill repeater site over the recent period of a day, week and month. Other slides in the presentation revealed the difficulty with ongoing cloud cover over Saddle Hill as viewed from Nelson city and also the snow on the solar panels, the ground and surrounding bush. David's presentation concluded with photos of the Denniston National System repeater site installation, undertaken in December of 2011.

It was now well past 12.30 pm and after a few words of thanks by Bob McQuarrie ZL3TY and an invite to all to attend Eastfest September next year in Ashburton, all involved departed in the various direction to home, having had a very enjoyable

*Mark Sullivan ZL3AB's presentation.*

*Rory Deans ZL2HB (left), Gavin Bradshaw ZL3VP (right) admiring David Scott's Antenna Analyser.*

*Barry Davenport ZL2LN – Lemon Battery Pack.*

# Around the Branches

### Branch 42; Honorary Life Membership Award

*Peter Lake.*

Peter Lake ZL2AZ joined Branch 42, Titahi Bay, in 1981 on his relocation back to Wellington with his family after working Hamilton, Whangarei (ZL1AIZ) and Western Samoa (5W1BZ). Over the intervening 30 years he has selflessly served the interests of Branch 42, as well as NZART and the wider amateur radio community. He represented amateur radio interests in various international forums including, since February 2005, as a Director of Region 3 of the IARU. His contributions at an international level required countless hours of research, preparation and report writing; as well as subtly surviving the slings and arrows of organisational politics at all levels. Internationally Peter is well known and highly respected.

In making the presentation Branch 42 Chairman Ken ZL2TKY, noted that many of the privileges we, as radio amateurs, enjoy today have been contributed to in no small way by Peter. At the branch level Peter is an active, willing and inspirational member: a great Elmer, fountain of knowledge, active and well known CW DXer – and a hard-working toiler; willing to roll up his sleeves and 'go the distance'.

Thank you and congratulations Peter.

### Christchurch Branch 05. Another RadioTek

Another RadioTek is now firmly under the belt of Branch05; the third for this year. Despite the wet weather, and the participants having to drive through devastated Avonside roads, we had a record number of 13 students, with about 5 new to the program. As usual the first timers made the simple AM radio for an earphone, the second timers made their speaker amplifier and the third timers made their FM adapter. All were given some training in basic radio, electricity and test equipment in addition to the project building. A couple of fourth timers brought their own projects to make, and one even bought his own workbench with tools.

We feel this RadioTek was particularly successful, not only because of the numbers, but we had one student, shown here with his home made crystal set, come back on the following Tuesday night for Amateur radio exam lessons. The rain, falling like cats and dogs, added to the lake05 water feature (which we used to call the car park), so the outdoor radio activity was curtailed. However, I have to add although The Team cancelled it, the students were still raring to go!

Further RadioTek days are scheduled for November and next year, so if you want to help us spread the word the booking contact details for these are Rory Deans 03 344 6292 or <rory1@xtra.co.nz> or go to our website at <http://www.radiotek.org.nz/>

Thanks to all the RadioTek team: Andrew 3AJT, Graham 3NK, Graham 3GSL, David 2IC and harmonic Matthew ZL3notyet, Brian 2BAT, Aidan 3APB, Rory 3HB, Des 3AK and Kelvin 3KB. I have to highlight that 3 of the team were young amateurs themselves.

*Many of the students braved the rain to show off their projects.*

*Mentor Thomas with student Des ZL3AK.*

*Student Matthew with home made crystal set.*

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weekend.

I would like to acknowledge Jim Meachen ZL2BHF for is help in editing this article and Stewart Robinson ZL2STR for providing the photos. βi

# The Morseman

Gary Bold ZL1AN
<morseman@nzart.org.nz>



### An unusual Kent Key

Ron ZL1AI wrote: "I bought a morse key at a ham sale a few weeks ago. I had no intention of getting a key, but ZL1TAD, running the next table had this nice classic looking Kent key with ball race bearings, and it felt very nice to use. At the end of the day he turned to me and said 'Make me an offer'. I apologised and said I couldn't offer more than $50, and he said 'sold'! We had finished packing and were on our way out, and I never did get to ask him about its history.

*Figure 1: Unusual Kent key bought by Ron ZL1AI.*

"I have taken a photo, (see figure 1) and compared it with one from the Kent website. Now the question is 'What have I bought?' Is it a Kent, perhaps bought as a kit and assembled wrongly? Or is it some older key that has been refurbished? I suspect the main rocker arm may be on upside down. I also suspect the contacts may be switched over, as the back contacts both appear to be faced with some light-coloured metal, possibly silver, whereas the front contacts appear to be just brass.

"It's in very tidy condition, with an almost new looking timber base, but if you look at the spring and at the screw threads and the knurling on the nuts, they look weather-beaten, as though the key is quite old. Tell me what you think of it please Gary, as it has me puzzled".

I don't own a Kent key, but these are highly regarded by many users. Ron was puzzled because the taper at the knob end is shown on the Kent website, and in all other photos on the web, on top of the arm, whereas the key he bought has the taper the bottom. No other keys I'm aware of have tapered arms at all. I suggested to Ron that he email Robert Kent, the maker, and ask him about the matter. He did so, and this reply came back:

"The key is a very early Kent. The arm is correct; it was modelled on a Marconi key. The arm was later turned over, as some operators like to rest their hand on the table when sending, and the key you have was too high.

"The white deposit you see on the contacts is a result of someone cleaning the brass with a liquid brass polish which has dried in the knurled parts. This is very difficult to remove. Try dipping the affected parts in a little citric acid and salt solution and rub with an old tooth brush, but don't dip the complete key. The flat and round parts can be cleaned with fine steel wool.

"I hope this helps. The key looks in good condition".

Regards.

*Robert Kent G4POY*

### Modulating arc transmitters

In the last column, I described how Duddell developed the theory of the oscillating carbon arc, and Poulsen increased its frequency of operation into the RF range, enabling the first true CW transmitters to be developed. These were enormously successful, but were Morse only, and it wasn't surprising that a number of people began almost simultaneously to experiment with speech transmission. Installation of land-line telephones, patented in 1877 by Bell, had been growing explosively, and by 1881 there were about 48 000 telephones in the USA. The "carrier/sideband" theory of modulation was still to be developed in 1914, by Carson, who a year later also invented SSB and FM. But this didn't stop experimenters attaching carbon telephone microphones to arc transmitters in a variety of empirical ways.

Who transmitted speech first? There are conflicting accounts, but the earliest, and most colourful claimant was Archie Collins[1], who you have probably never heard of. Archie said in 1922 that in 1899 he had transmitted speech a distance of 200 ft, using "an arc lamp connected to an aerial and ground, using a microphone to modulate oscillations, receiving this with a pill-box detector devised by Sir Oliver Lodge". This anecdote appears all over the place, but I don't believe it, as Poulsen didn't succeed in generating RF from an arc until 1903. Collins' term "pill-box detector" is used by nobody else, and there's no reference to Oliver Lodge ever inventing such a thing. Lodge did develop an improved coherer having a "trembler" to de-cohere the clumped filings, and this is perhaps what Collins meant.

Nevertheless, Collins did patent his system in 1906, and by 1908 was said to be transmitting and receiving speech signals over a distance of 12 miles in New York. *A Scientific American* article[2] describes this, with a schematic. Since standard telephone microphones overheated, Collins developed "multiple, water-cooled microphones which could carry currents of 10 Amperes". He formed the Collins Wireless Telephone Company, and in 1909 toured the US giving demonstrations to promote sales of stock. One of these was attended by Marconi, at this time a figure of considerable authority, who immediately credited Collins with inventing wireless telephony.

But all was apparently not as it seemed. Like many technical innovators, Collins appears to have been either naive or readily seduced by money. His co-directors were men of financial acumen but dubious ethics, and the demonstration that Marconi saw was ruled fraudulent in 1911[3]. Typically, two adjoining hotel rooms were rented, with coils of the transmitter and receiver placed hard against opposite sides of the separating wall, and transmissions were coupled not by RF, but inductively. The directors were indicted for making "extravagant and misleading claims and stock fraud", convicted, and sentenced to four years in jail. Collins served one year, and was then released.

A pity, for despite his somewhat extravagant claims (not at all unusual amongst the pioneers of wireless) he had been an engineer of genuine ability. After his release from jail he wrote over 100 books and 500 articles on electricity, wireless, chemistry and astronomy. The New Zealander Alan MacDiamard[4] was inspired by Collins' 1924 book "*The Boy Chemist*" to become a chemist himself, and won the Nobel Prize in 2000 for discovering electrically conducting polymers.

You'll find many other references to early experiments on the web. Charles Herrold was credited with making the first radio broadcast from a studio in 1913, and a site describing his equipment[5] also gives the schematic of an early arc audio transmitter said to be constructed by Lee de Forest. This shows a carbon microphone inductively coupled to the tank and antenna coupling circuit. Something similar was used by Ron ZL1AI, who emailed:

"When I first came on the air in 1947 on CW only, I was unable to join in some very interesting local phone nets, so I hooked an old telephone carbon mic to a one turn loop on the bottom of my VFO coil. This really worked a treat with good reports of speech quality (???) Then after several months someone with a sharper receiver told me my carrier was wobbling, so I had to set to in a hurry and finish my high-level modulator. (using a power transformer for a modulation transformer)."

### A Morse Reading Competition

Alastair ZL2ARC sent this: "During June I was overseas on business attending IMS-2012 (International Microwave Symposium), a conference organised by IEEE, which this year was held in Montreal.

"One of the evening functions was a ham radio reception and one of the activities was a Morse code competition. About 10 people took part. We had to copy Morse code at speeds starting at 5 wpm and incrementing upwards, answering questions about the text sent. I copied the final passage at 30 wpm and managed to win myself a 32GB Blackberry® play book! 30 wpm from a computer is much easier than copying off air!"

See figure 2, where Alastair is shown receiving the prize from Nicholas Kolias, the IMS president. Nice work Alastair! It's heartening to see a ZL winning such a competition!

### A & W McCarthy Morse Keys

Herman VK2IXV is a well-known key collector and historian. He sent this account giving the background

*Figure 2: Alastair ZL2ARC is presented with a Blackberry for reading code at 30 wpm.*

of one of the few firms that sold Morse keys in this country.

Recently I added to my collection a rare New Zealand hand key with "A & W McCarthy Dunedin & Invercargill" on its nameplate. See figure 3. Under the key's base, the bottom screws and wires are embedded in the wood and sealed with wax. Similar wax sealing of wiring leads is seen on some British landline telegraph keys and some WW2 military keys. This was done to prevent the screws from working loose with constant use and to minimize the onset of the blue/green patina that forms on brass when it is exposed to air or seawater over a long period of time.

Most of the wax on the bottom of my key had fallen out and or dried up. I scraped out all the old wax and undid the screws to lightly clean/polish the corroded brass hardware, removed the dirt from the wooden base, and gave it a good soak in wood oil. During cleaning I spotted a letter V underneath the trunnion, on the trunnion pin and on the lever, of which I don't know the meaning. From a local surf shop I purchased a block of surfboard wax, which had the right texture, and resealed the key' and wires under the base with the new wax.

Were the keys both made and distributed by A & W McCarthy? A well-informed source in New Zealand told me that the keys would have been made elsewhere, probably in Britain, because A & W McCarthy sourced a lot of items from Britain, and labelled them with their own brand. This was then quite a common practice in the business world. For instance the NZ 'Supreme' semi-automatic (bug) keys were made by Eric Sorensen for distribution by Tricity House, Christchurch and the Australian Levenson's bugs were made by Buzza in Sydney, but labelled and sold by Levenson's Radio in Sydney.

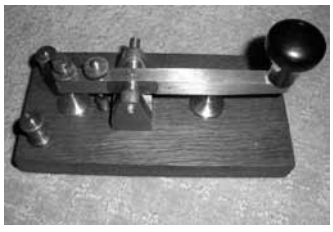


*Figure 3: Rare McCarthy key Obtained by Herman VK2IXV.*

### Who were A & W McCarthy?

The firm started in 1861, when a Samuel McCarthy traded in Dunedin as a bell-hanger, locksmith, gunsmith, machinist, gasfitter and general jobbing smith. In 1894, his sons Arthur and Walter took over the company, called Messrs. A & W McCarthy gunsmiths, locksmiths and fishing tackle dealers.

The A & W McCarthy retail company sold sporting goods, fishing equipment, hunting equipment, catalogues and miscellaneous hardware, but, as far as I can establish, also radio components, Morse keys (hand keys and bug keys) from the 1930s till the 1980s.

"McCarthy's", as it was known amongst its customers, was located in Lower Stuart Street, Dunedin, with branches in Invercargill and Palmerston North. The third generation McCarthy to own the business was Arthur Cormack McCarthy. The fourth generation, Frank McCarthy bought the business from his father in 1978, but in 1996 sold his shares to the McCarthy company directors and severed his links with the company. From 1996 – 2000 Mike Weddell was shop manager.

In the year 2000 the business went into receivership and the company Centrefire Sports bought McCarthy's name and stock and became Centrefire McCarthys Stream and Field Store Dunedin. The original McCarthy's is no longer, but the name lives on.

Incidentally, I (Herman) am still looking for a McCarthy bug key. If you have one you can part with, please contact me by email, at <hermanusw@gmail.com>, or write or phone Gary, who will pass it on.

### Last month's problem

First, an apology. The resistor "R1" referenced in the text should have been that shown as "Re" in the schematic. Admirable answers came in from Basil ZL1TOW, Ross ZL3TFK, Gary ZL2TBH and Alastair ZL2ARC. I was impressed! Incidentally, all these experts usually correctly answer every problem I set.

See figure 4(a). Since the currents through $R_L$ and $R_e$ are the same, the collector voltage will be 9 – 3.3 = 5.7V. The voltage gain is $A_v = -R_L / R_e = -3.3$. The base voltage is 1.7V, so applying Ohm's Law, $I_b = V_{ce} / R_b = 7.14\ \mu A$, and the DC $\beta = 140$. This biasing method gives some immunity to changes in transistor beta.

The input resistance is affected by negative feedback from both $R_b$ and $R_e$. Without $R_b$, it would be increased to $r_b + (\beta + 1)R_e$, where $\beta$ is the small-signal current gain of the transistor. Assuming that the small-signal beta value is the same as the DC value, this resistance contribution is about 140 k. But this is in parallel with the contribution of $R_b$, and by Miller's theorem, this will be $R_b / (A_v + 1) = 130\ k\Omega$

I haven't seen this circuit used anywhere else, so I probably invented it myself. It's useful as an input stage. Combining these two contributions in parallel gives about 67 kΩ

To check this, I constructed this circuit using a BC549 transistor, which has a higher beta, estimated as about 330. I measured the input resistance as about 100 kΩ which agrees well with the theoretical value calculated as above, with the higher beta value substituted.

I haven't seen this circuit used anywhere else, so I probably invented it myself. It's useful as an input stage having an input impedance an order of magnitude higher than that of a standard common-emitter amplifier, though less than that obtainable with an op-amp voltage follower circuit. But it is simple! See an expanded explanation, with full calculations and measurements, on my website[6].

### This month's problem

See figure 4(b). A transistor connected like this appears in the schematic of the famous LM741 operational amplifier, and occasionally in other circuits. What is this configuration called? What are its characteristics? Why is it useful?

### References


[1] Google on "Wikipedia Archie Collins"

[2] Collins wireless telephony: <http://earlyradiohistory.us/1908col.htm>

[3] Collins demonstration fraudulent: <http://www.sparkmuseum.com/COLLINS.HTM>

[4] Alan MacDiarmid: <http://www.nzedge.com/heroes/macdiarmid.html>

[5] Herrold Broadcast <http://www.charlesherrold.org/see.html>

[6] See "High input impedance Amplifier" at my website <http://www.qsl.net/zl1an/index.html>

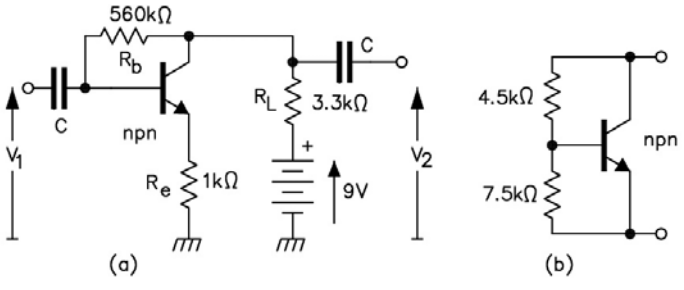




*Figure 4: (a) Last month's problem. (b) This month's problem.*

# DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graemeh@xtra.co.nz>

Conditions over the last two months have been average with the SFI around 110 but the bands will gradually improve as the days lengthen. Most of the DX I've been working has been on 20m around 0400z – our late afternoon.

Once again the DX world has enjoyed a well organized DXpedition, this time to the Comoros Islands off the east coast of Africa. D64K went in the log for 50 ZLs. ZL3TY and ZL3NW even worked them on 6 m EME using digital techniques – very impressive.

The small enclave Sovereign Order of Malta SOM was activated with 1A0C operating in Rome and was a new one for many. Confused by the Malta title? The order was actually formed over 900 years ago in Malta and later moved headquarters to Rome. We know it better as the Order of St John. This is one of the few special entities within countries, similar to the Vatican HV0 which is also surrounded by Italy and has been active recently, although some activity was by a pirate. Similarly there are separate entities of United Nations in New York, 4U1UN, and the International Union HQ in Geneva, 4U1ITU.

There are several very rare DXpeditions popping up soon. St Peter and Paul Rocks PT0S 900 km off the Brazilian coast is due 10 to 22 November subject to weather and boat issues. The rocks are near the equator, between Brazil and Africa. There have been regular Dxpeditions to the rocks, with the last in 2004.

Mauritania 5T0SP is another from 24 November to 10 December which should be on 160 – 10m, all modes, see their web page <www.5T0SP.dxing.pl>

### Campbell Island

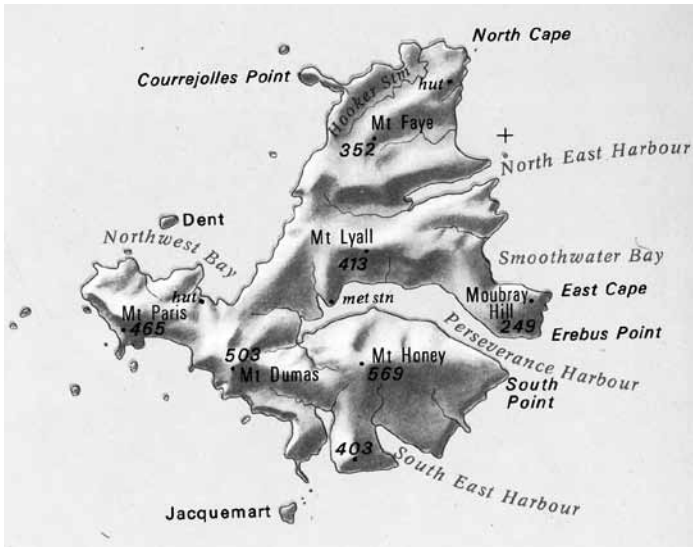
The really big one is in our own back yard, ZL9HR Campbell Island. It has been many years since there has been any operation from Campbell, although I can remember many contacts in the 70s with staff at the weather station. From the DXpeditions excellent website, <www.campbell2012.com>

"The team at the Hellenic Amateur Radio Association of Australia have all permissions including the landing permit to Campbell Island (OC-037) and are in the process of building out three shipping containers in Sydney, Australia, to be used for transport of all equipment and supplies required. The DXpedition will be on Campbell Island between the 28 of November and the 9 of December.

An international team of operators has been assembled for this event on the sub-Antarctic Campbell Island which is located 650 km south of New Zealand in the Southern Ocean. This is the biggest DXpedition by an Australian club in 25 years and it promises to be the most sought after DXpedition in 2012 overall. The complete crew of 10 operators is: Tommy/VK2IR, John/VK3YP, Les/W2LK, Gene/K5GS, Don/VE7DS, Istvan/HA5AO, John/9M6XRO, David/K3EL, Jacky/ZL3CW and Tom/KE4KY."

This operation will be very easy to work on most bands from ZL, so I urge readers within New Zealand to avoid times when the bands are open to Europe particularly and to a lesser extent Asia and the Americas. We all know what it's like to try to break through the EU/NA/AS walls when rare one's pop up in their areas.

*Not the usual tropical island holiday, no beaches, no hula girls.*




*Campbell Island.*

### Swains Island

Hopefully by the time this magazine arrives, the DXpedition to Swains Island NH8S will be in your log. Swains Island is near the Tokelaus, and was previously owned by the Jennings family and formerly known as Jennings Island. This is not the Lee Jennings ZL2AL, prominent DXer, contester and former writer of this column; although I'm sure Lee would have enjoyed living there. See their website <www.nh8s.org> for QSL details.

The ultimate DX: George ZL3PN has got his call-sign to Mars. He will be more surprised than anybody if he gets a QSL back. George is a keen supporter of NASA's various programmes. His name and call-sign is a on a chip attached to the Mars Curiosity lander that arrived on Mars in August.

The new Prime Minister of Serbia is a radio amateur; keep an ear open for Ivica, YU1YU.

Niue has changed prefix from ZK2 to E6.

### August DX Quiz

Congratulations to our two winners; Jeff ZL1BIV/ZL1XX and Rupert G4XRV. Correct answers were: North Korea, Burkina Faso, Myanmar, Baker/Howland Is, Mt Athos, Bouvet Is, San Felix Is, Chad, Pratas Is.

One entrant even sent me photos of QSL cards from Bouvet and Howland Island; which I still need. I thought this most unfair, and akin to showing a bottle of gin to an alcoholic.

Jeff ZL1BIV/ZL1XX includes a handy hint which I'm including: "Instead of keeping your QSL cards in a shoe box, or as I found visiting an old timer a while back, in a clip folder designed to hold post cards. A flash of brilliance: scan the QSL Cards into your computer then store

them on an SD card and use it in a digital photo frame. Keeps the natives interested and the tourists amazed."

### Club Log

Some months ago I wrote about Logbook of the World LOTW, a secure logging and QSLing website run by ARRL. Another very useful site is CLUBLOG at <www.clublog.org>. Basically you upload your computer log in ADIF format and it retains this in your own secure account. Well, that's just the start. It lists your worked countries and maintains a reference of which countries have worked all the other DX. For example if I want to work Mayotte FH4, and I do, a search of club log will show all the ZL contacts with FH4, extrapolated by band and time. Click on Propagation and set your parameters like current solar flux index and month, and it will produce charts of each HF band with time and number of contacts made from ZL to FH4.

This is a very useful tool when looking for the rare ones. There is an exhaustive list of functions CLUBLOG provides, including:

1. A great circle map based on your Maidenhead grid.
2. Search function for any call-sign; see whether you have ever logged a station, obviously he/she and you must have sent logs to CLUBLOG.
3. A timeline of how many QSO's you have had each year, by phone, cw and digital.
4. A list of the world zones you have worked extrapolated by band.
5. A league table; who has worked the most, including by country or club.
6. DX spots that have ever appeared for the countries you haven't worked yet.
7. A search of any log to see whether they worked someone – not necessarily you.
8. List of most wanted countries based on logs received. Navassa Is is still #1.

All that must be expensive right? Well how much will this cost you? Not $500.00, not $50.00; it's free thanks to the author Michael G7VJR and a bunch of helpers.

### Oceania Contests

Phone is on 6 and 7 October and the following weekend 13th and 14th it's CW. These are excellent opportunities to work some DX. Both contests are well supported throughout the world, most beams are pointed our way and the ZL prefix is keenly sought. You don't need to be a keen contester or operate for hours. The cipher is 59001, 59002 etc for phone, and 599001, 599002 etc for CW. One of my favourite times is from around 2000z on 20m and 15m when Europe, Africa and the Americas signals arrive from the west – which of course is long path from US and the Caribbean. Check the contests column elsewhere in this magazine or visit <www.oceaniadxcontest.com> for more detail.

### DXeditions

Lots of goodies over the next few months:

*Afghanistan T6LG;* till February 2013.
*Angola D2FJZ;* for the next year.
*Bermuda VP9KF;* between November 5-19.
*Burundi 9U;* look for HA3JB, now living there. 20m SSB and PSK31.
*Campbell Is ZL9HR*; 28th November to 9th December.
*Chagos Is VQ9JC/ND9M*; until mid November.
*Djibouti J28NC;* for the next two years.
*Gabon TR*; Sebastien, F4EIH, will be in Gabon for at least three years.
*Gough Island ZD9KX*; for one year. ZD9KN heard on the bands recently was a pirate.
*Heard Island VK0HI;* proposed for 2014.
*Jan Mayen JX9JKA*; till March 2013.
Kenya 5Z4/SM1TDE between November 5-22.
*Liberia EL2A*; Look for the VooDoo Contest Group between 21st-27th November. Individual operators will also be using their own EL2 calls.
*Mauritania 5T0SP*; from 24 November to 10 December.
*St Peter and Paul Rocks PT0S;* November 11 to 22
*Uganda 5X1NH* till December 12 80-10 m all modes.

### Nets

ANZA Daily: DX net at 0515z on 14183 kHz and now also Saturdays 0445z on 21205 kHz. Mondays, Fridays and Saturdays it is followed by the Pacific DX net on the same frequency from 0600z.

Arabian Net: Fridays only 0500z 14250 kHz; host JY5HX and features exotic Middle East calls.

ZL DXers: Tuesdays 8pm NZ 3777 kHz

What's on the air now? <www.dxsummit.fi/DxSpots.aspx>

QSL information: <www.qrz.com>

Acknowledgements, 425 DX, OPDX Bulletin.

Contact me at *Call-Book* address, or by email at <graemeh@xtra.co.nz>.

# New Members

| *Name* | *City/Town* | *Branch* | *Call-sign* |
|---|---|---|---|
| IF Andrews | Lower Hutt | 18 | ZL2IFA |
| G P Gordon | Dunedin | 30 | ZL4GPG |
| PS Dodds | Oamaru | 64 | ZL4XYZ |
| J W Bollond | New Plymouth | 27 | ZL2JBK |
| M Motion | Auckland | 29 | ZL1MIT |
| A Makinson | Tauranga | 53 | ZL1TAX |
| M Ialynnyi | Warkworth | 29 | ZL1UR |
| M Wiig | Auckland | 29 | |
| P McCormack | Warkworth | 71 | ZL1PCM |
| Terence Given | Papakura | 65 | ZL1TG |
| G Russell | Browns Bay Auckland | 29 | ZL1TWZ |
| E Bretscher | Bluff | 37 | ZL4EB |
| Michael Cox | Auckland | 29 | ZL1GV |
| James Murray | Orewa | 29 | ZL1ABA |
| Steven Robertson | Auckland | 29 | ZL1AVS |
| Alfred Ghazzi | Auckland | 29 | ZL1GZZ |
| Neil Henson | Orewa | 29 | ZL1EN |
| RJ McLeod | Mosgiel | 30 | ZL4FP |
| M Duffy | Christchurch | 56 | |
| M Gray | Whangarei | 28 | ZL1MEG |
| DA Kavanagh | Parnell Auckland | 2 | ZL1DAK |

# Silent Keys

*The Association deeply regrets to record the death of the following members and extends its sympathy to the bereaved.*

**Silent Keys: guidelines to contributors**

*Contributors are requested to limit their obituaries to between 200-400 words. Content should focus mainly on the amateur radio activities of the deceased. Normally photographs cannot be included.*

### Avery William Jeffries ZL1AJI

On 9 July 2012 aged 85, Avery became a Silent Key. Born in 1927 at Barmera Australia, he was 10 years old when his family moved to ZL. In 1956 he became New Zealand's Discus Champion. On retiring in 1985 from the Police Force as District Commander of Waitakere region, Avery took up Amateur Radio and was first licenced as ZL1UKD. His favourite mode was CW, both straight key and paddles. He became President of Branch 03 in the early 1990's and with Roly Jury, was responsible in teaching CW to many Hams wanting to upgrade.

Avery was certainly busy in his retirement, taking up photography, archery, fishing, golf, model railways and music as well as Ham Radio. Avery is survived by his wife and four children. Branch 03 offer our sincere sympathy to Iris and family. He will be missed by many friends and organisations.

*Grant Manning ZL1GSM*
*V-P Branch 03*

(The Branch also acknowledges the passing of Jack Hobson ZL1CUC and Malcolm Brown ZL1AZ)

# VHF Scene

Simon Watt-Wyness ZL1SWW
<zl1sww@nzart.org.nz>

As I start to put this column together, it is late August / early September, slowly we are approaching the fun time of the year when the bands start to perk up again. Over the winter months, activity gets a bit thin so hopefully we will see heaps of activity in the following months.

This edition of the 'scene is a bit thin due to the lower activity and more so, my ever pressing work commitments. Thanks always to my regular contributors, I couldn't do it without you! Anyway, on with the column…

## General

### Silent Key

- ***Paul Lieb*** KH6HME

Paul Lieb, KH6HME, of Hilo, Hawaii, passed away July 16, aged 84. Paul was best known for his VHF work and his radio beacon on the slopes of Mauna Loa where he worked the famous trans-Pacific tropo duct to the West Coast. Lieb achieved many tropo ducting distance records up through 5760 MHz and received the Dayton Hamvention Special Achievement Award in 1999 for "his pioneering and record-setting work in tropospheric ducting and VHF, UHF and microwave communications." On August 21, 1999 Lieb, in grid square BK29go, and Clint Walker, W1LP/mm, in grid square DL51ce set a world tropo ducting distance record on 2 m with a two-way SSB contact on 144.170 MHz at a distance of 2954 miles (4754 km).

Paul discovered that the Pacific duct was usually located much higher, around 8000 feet, at the Hawaiian end. It occurred more frequently and was much stronger at this elevation than sea level. Paul set up beacons on the slopes of Mauna Loa at 8200 ft on 144.170, 432.075 and 1296 MHz with the exception of the 6 m beacon, which is located in lower Puna in the Hawaiian Beaches sub-division on the Big Island of Hawaii. It was a long three hour drive from Hilo, where Paul lived, up the slopes of Mauna Loa to reach the beacon site to operate. When the beacons stopped keying, eager VHF operators across the Pacific knew he was there. The first beacon started operating on 432.075 MHz in April 1979. In 1980, the 1296 MHz beacon was activated, and in 1981, the 144.170 MHz beacon started sending its signals to the Mainland West Coast of the United States. There is also a 10 GHz beacon that is turned on when conditions are favourable. One of Lieb's close friends, Fred Honnold KH7Y helped him maintain the beacons. The KH6HME beacons on the Big Island are still active and Honnold is working on plans for the beacon site with Lieb's family. A memorial service for Lieb was held July 21 in Garden Grove, California.

## EME

Peter ZL4LV has experienced some unusual propagation during some EME testing and contacts. He outlines his experience.

"On Saturday the 30th of June I decided to check out my EME (moon bounce) aerial system. The aerial is horizontally polarised with no elevation. The WSJT software has an echo mode included in which pulses of 1500 Hz are transmitted and after a suitable delay of 0.5 of a second the receiver checks to see if a return pulse can be detected .The software corrects for Doppler shift and also includes an optional dither to reduce the effects of " birdies". In this echo mode the WSJT software gives a return signal strength on scale of 0 to 10. Zero of course being nothing. Also given is a frequency difference DF which should be close to zero. In past tests I have received 1's 2's and some 3's return signal reports.

On this day moonrise was scheduled for 0143 at an azimuth of 117°. From my QTH this looks right out over the ocean. A few minutes before the scheduled moon rise I started the WSJT echo mode. When the moon was at –1° as given by the software I started to receive a return signal, this was not unexpected as I am at 200 m altitude and the software probably calculates for sea level. As the moon rose the signals rapidly increased so by 0° was receiving up to 10 on the signal strength. It remained up to about this level with some variation until +1° then started to decrease slowly:

| Angle Above Horizon | Signal Strength |
|---|---|
| 2.5 degrees | 5 |
| 3.7 degrees | 3 |
| 3.2 degrees | 2 |
| 3.9 degrees | 1 |
| 4.4 degrees | 1 |
| 4.8 degrees | 2 |
| 5.5 degrees | 1 |
| 6.0 degrees | 1 |
| 7.0 degrees | 0 |

*Elevation versus Signal strength above horizon.*

This phenomenal return signal at the low angle caught me by surprise and I did not write down the readings initially so the figures from –1° to + 1° are from memory just after the event. I initially thought someone was having me on but I had not announced my frequency or that I was transmitting on the N0UK JT65 EME logger.

Ground gain over the ocean was obviously having an effect but the strength of the return signal was the surprise. The dither mode (a random frequency change) was in operation so the effect of birdies in the pass band was reduced.

However I left the transmission running calling CQ. By this time I had made an entry on the EME logger that I was calling. About every few minutes I switched back to the echo mode to see if anything appeared. In the past I had seen echoes at eight degrees, There was nothing but 0's until about 9.2° when 1's started to appear. At 10° 2's appeared then at 10.4° a succession of mainly 10's appeared, dropping to 5 or 6 at times. By 10.9° the signal started to drop, at 11° it was 4, 11.2° down to 1. 11.3° down to zero, followed by a small peak of several 1's at 12.4° then nothing more.

This was obviously a second lobe on the aerial but the high return signal at this elevation was not ground gain as I had assumed from the results at the initial low angle.

Unfortunately in the excitement I did not record the DF for the low angle return signals but for the higher lobe the DF at 10.5° was 0.77 and at 11° was 0.95.

The signal strength on the lower lobe could be partly accounted for by ground gain, but what cause the high return signal on the higher lobe? Perhaps someone has an answer.

I did receive two signal reports on the EME logger to my CQ's. One at –24 and the other at –25. Both of these were logged at the period of the apparent null between the two lobes.

At this time the Degradation DGRD was about 2.5 and the moon near the closest part of its orbit to earth. Reference <http://www.mm-monvhf.de/eme.php>

The following day on Sunday the 1st July moonrise was at 0231 at 121° azimuth, again out over the ocean. This time I was somewhat better prepared. Also present were Hugh ZL4HL and David ZL4DK.

Again the first signals were detected at –1.07° with a 1, then some more 1's and 2's then a 6 at –0.4°. Signals fluctuated over the next few minutes with 3's, 4's and 6's then dropping to 0 at 3°. Some more 1's between 3.2° and 5° but nothing further was observed. This looks more like ground gain.

Over the next two weeks checks were done on several days but with nil results. As the moonrise worked further north I lost the low angle path over the ocean, although in the early stages I could still see the horizon over a low ridge My operating window for a clear view out over the ocean is relatively short so there are limited days in which tests can be done.

My QTH is on the south side of Dunedin city and is located on a ridge running approximately NE, the altitude is 200 m and the path East to the ocean slopes away steeply at first then levels out with several small ridges. The coast is about 5 km away.

The aerials I am using are two 12 element Yagis from a G0KSC design, they use a 7.5 m boom. Spacing is 3 m, the lower Yagi is 1.45 m above a tribander. This lower Yagi is 9.6 m above the ground.

The strength of the returned signal on the 30th June amazed me, was I observing a new phenomenon or was I creating some errors? The EME set up had not changed from previous or subsequent transmissions. The low angle results could be accounted for by ground gain to some extent but the higher lobe results raise some questions. It was a pity it could not fully duplicated the

following day. It will be some time before the moonrise is in a similar position over the ocean to see if the results can be repeated.

About a month later, on Thursday the 26th July the moon was again in a similar position at 110° so I attempted to see if the earlier situation could be repeated. When the moon elevation was at –0.9° I could detect the first echo with a reading of 1, the reading rapidly increased as the moon rose reaching a brief peak of 9 at –0.7° . The readings fluctuated between 4 and 6 over the next two minutes dropping to 1's and 2's at 0°. It then stated to rise again peaking at 4 between 2.5 and 5° dropping to zero at 6° . There was no indication of a second lobe peak at about 10° that I had observed on the previous occasion. The fluctuating signal strength readings would probably be accounted for by Faraday rotation plus other effects. I am obviously getting considerable ground (ocean) gain when the beam is in this particular Easterly direction at low angles but does not fully answer the very high received return signals at the higher angle I observed about a month earlier.

When the moon elevation was about 1° I stopped the regular echo readings and called Joe CT1HZE who had been working Simon ZL4PLM in Christchurch. However it was too late as the moon had set at his end. I could also copy Simon probably direct. I arranged a sked with Joe CT1HZE for the following day.

On Friday the 27th a few minutes before my local moon rise I started to call. At –1.2° as given by the WSJT program his call appeared, with the usual acknowledgements of RO and RRR the contact was successfully completed in a few minutes, a copybook contact. His best signal was at-18 and he gave me a report of –16. The distance according to the WSJT program was 19 048 km. Later on I again checked to see if there was a higher lobe present on my aerial but nothing appeared.

On Saturday the 28th I again repeated the echo tests, this time the return signals peaked at 4 at an elevation of 6° , different again. The local noise was 2 or 3 dB and the degrade at 3.8. The following day the 29th nothing at all was received. Local noise was up to 5 dB and the degrade was 6. Both days had a clear view out over the ocean.

This direction to the east from my QTH when the moon rise is over the ocean seems to capable of very good results. Unfortunately because of the time of the day or night activity at the other end is very low so few contacts result.

I have recorded this in some detail as much has to be learned about EME communication and in case someone else has observed similar propagation enhancement."

Peter also adds that after working CT1HZE on EME as mentioned above, I thought it may have been a record as the path was to the East, not the normal West direction. The distance calculators I have found seem to only show the westerly short path However looking at a great circle map the direction to Portugal is almost over the South pole and there would appear to be little difference in length between the two paths The distance for this contact was 19 043 km. However I did some research on some other 2 metre EME contacts that I have made and found one with F6APE in IN97pi grid square on the 9th May 2011 to be 19 300 km according to the calculator in LOGGER 32. This seems to exceed Bob ZL3TY's record in the VHF records by about 60 km. I thought I would note this here as the official VHF record keeper position is still vacant as far as I know. Others could have bettered this.

### 6 metre Activity

Six has seen bits of activity within the country as well as some DX between VK and ZL. Rod ZL3NW has been working into VK2 and 7. VK3DUT has been hearing the ZL3SIX beacon amongst the crud on the band. There have also been spottings from JA2MBF who was hearing the ZL Video on 45.2396 MHz.

### 2 metre Activity

The VK logger is showing various pockets of activity with WSJT modes and some 2 m SSB contacts. These were mainly happening in August.

### Microwave Activity

Steve ZL1TPH has been making smaller versions of more portable gear for 3.4 and 5.7 GHz using some 60 cm dishes. Not much activity from the scribe's QTH on the microwave bands due to serious work commitments etc.

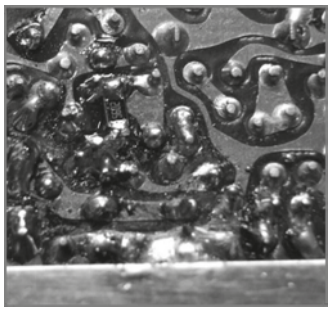
### Other Technical

FT290 mark 1 ALC issues. Many owners around the world with these radios have suffered the mysterious ALC/AGC issue where the radio behaves like a valve radio warming up but in really slow motion. The S meter goes FSD and then will settle back after 40 minutes or more. Meanwhile there is no Rx or Tx. Note this occurs in the SSB mode only. FM appears to be OK.

The scribe has one that exhibited this fault. To date no one has been able to point an exact finger at the fault, but much conjecture has been seen regarding caps drying out and even the phenolic board absorbing moisture. Leaving the unit in the sun whilst off will also speed up the problem to almost normal power on operation.

There is a fix for this luckily which involves putting a 47k resistor across the base – emitter leads of a transistor (Q1014 in this case). This seems to resolve the issue. Now this radio works nicely as an IF rig for the microwave bands. More info is available from the "*Electric Handbag FT-290*" Yahoo group.

As this rig is not a nice thing to service, I attached a file on the site, outlining the PCB tracks where Q1014 is located and where to put the resistor. The components are all squashed together vertically so is quite hard to identify.



*Location and placement of the AGC damping resistor.*

### Other Matters

2012 VHF-UHF-SHF Contest Calendar. All bands 614 MHz and up. (6 and 7 October)

Field Day Contest, All bands 50 MHz and up. (1 and 2 December)

For all contests, the operating periods are 1700 to 2300 on the Saturday, and 0700 to 1300 on the Sunday, NZ local time. The Contest Rules are available at: <www.vhf.org.nz/VHF-UHF-SHF-ContestRules> . All contest logs should be sent, to arrive within two weeks, to: <zl2wa@clear.net.nz>

### Summary

Many thanks go to the contributors who help make this column happen with their input – ZL4LV, ZL1TGC and others. If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Simon ZL1SWW <zl1sww@nzart.org.nz> or *Call Book* addresses. (I also accept large picture files sent via email).

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# Digital Modes

Murray Greenman ZL1BPU
<zl1bpu@nzart.org.nz>

It might not look much like it as I look out the window today at the rain pelting down, but clearly spring has sprung, and it's time to plan those summer radio activities. New antennas, camping trips (with a mountain of radio gear of course), visits to lighthouses etc may be on the list. I'm thinking of buying myself a modest caravan, which only needs to be big enough for me and some radio gear. I'm getting too old and stiff for camping!

Which reminds me, I had a chat recently with Chris ZL1CMB who was taking part in a Lighthouse Weekend, and in charge of the Digital Modes department. We had a quick go at SSTV. The best 80m signal I've ever heard from Chris.

### Talking clocks

I promised to say something about talking clocks. Some of the earliest were primitive gramophone affairs, and the most well known was the type that spoke the time by telephone. The British Post Office set up their famous TIM the talking clock in 1936[1], but it was not the first, that honour going to France. There are many still running today, including ones in Wellington [2], Canberra, and one in the USA provided by NIST.

An email-friend in Australia, Jim Palfreyman, has rescued and restored Tasmania's first talking clock, and has it running at home, synced to GPS time. It is wired up to an old bakelite phone in his workshop, and when you pick up the handset, it tells you the time!

There have over the years been several commercially available talking clocks, ranging from toys upward. I have a highly collectable Sharp CT-660, which I bought for an exorbitant sum in 1979. It has a reasonably intelligible US male accent, and announces the hours as well as telling time at the touch of a button. The alarm feature is cute; it wakes you with a chime call and voice announcement, and if you don't push the button to cancel the alarm, it repeats the message every five minutes and adds "Hurry up please!" Mine is in good working condition, despite operating continuously for well over 30 years. Remember 1979 was before the days of digital devices, microcomputers and well before PCs with sound cards. The Sharp CT-660 was probably the first readily available fully solid-state talking device, and runs for ages from two AA cells.

At one time a Sharp CT-660 Talking Clock was fitted to the GB3LC repeater. I lived in the UK 1990-1995 (as G0PFG) and operated the GB3LC repeater at times. In the mid '80s I fooled with my own low powered VHF repeater, and had the CT-660 hooked up to it. You could trigger the message via a small connector hidden behind a rubber cover in the side.

I'm not sure when the first commercially available talking clocks were available, but the first I ever saw was one made by Panasonic, when I was in Japan in 1975. This clock was electro-mechanical; it had an optically encoded glass disc in the bottom (60 x 24 = 1440 one minute recorded tracks, like a film sound track), and had a read head, like that in a floppy drive, but optical, which stepped every minute. When you pressed the big button on top, the disc in the box below rotated once and the message for that minute was announced. The clock was bilingual (English and Japanese). The clock was shaped like a cube about 150mm each way, and had an electromechanical (analogue) time display on the front. There's another Panasonic of similar vintage, a clock-radio (RC6900), which uses the similar electro-mechanical optical technology and dates from 1973. You can see this one on the Internet.

I have another talking clock, of rather lesser quality, which dates from the late 1980s, called a "T-10 Talking Alarm Clock". No doubt you've seen one or have one, as they were widely available. It runs off four AA cells, and is pyramid-shaped, white with grey trim and a grey button on top. Interestingly, the LCD display, controls and batteries are on the bottom. This one has a very Japanese-American lady's voice, and sounded rather weird until I got inside and slowed down the voice chip with a judiciously placed capacitor. As you'll see from the photo, I also added a connector on the side so I could remote trigger it. For an alarm call, this one crows like a rooster!

Finally on this subject, there are many PC and Android talking clock applications. My favourite is the Multilingual Speaking Clock by Lux Aeterna[3]. It can speak in over 30 languages, and I find the Australian lady by far the most intelligible. It can announce automatically, so could be used to add time markers to audio recordings.

### Using the correct mode

On HF, there is not at present a great deal of digital mode activity, and what you will find is generally either PSK31 or (for contests) RTTY. The lack of activity is disappointing (when compared with how it was during the last sunspot cycle), as is the scarcity of other modes. It seems to me that few amateurs have put any thought into what modes should be used under different conditions.

In recent years there have been a few papers containing the results of analysis of the performance of a range of modes under different conditions. I have also done quite a bit of testing of different modes using an ionospheric simulator[4], and wrote a book on the subject[5]. While a simulator can't replicate particular ionospheric conditions exactly, since they are invariably complex, the simulator can provide completely repeatable conditions, allowing accurate and repeatable comparative performance measurements to be made.

So what digital mode should you be using? Well definitely not PSK31 on all bands under all conditions. PSK31 is excellent for short-haul 20 m DX, but suffers badly from Doppler-induced errors on longer paths and static on lower bands. Never mind if the DX signal is strong; you simply won't be able to decode it reliably. On the higher bands, a much better choice for long path DX would be MFSK16.

What about RTTY, the other popular mode? I can't think of a good reason ever to run RTTY these days, as it was designed for use on landlines, and suffers badly from loss of sync caused by noise. On the lower bands it suffers badly from multi-path errors which mess up the character timing. Again, even if the signal is strong, it won't print correctly.

The reason why RTTY is still used for contests (apart from the obvious reasons of inertia and conservatism) is that it is fast typing, quick to tune in and quick to decode; in other words it is a 'slick' mode with almost no delay. I submit that a much better mode to use would be DominoEX11, which also has these same properties, but with the added benefit of very robust multi-path and noise performance and solid sync. Try holding a QSO one evening with any other ZL or VK station on 80 m, and see how RTTY, PSK31 and

*Figure 1. The Sharp CT-660.*

*Figure 2. The T-10 Talking Clock.*

DominoEX11 compare!

So, you say, how do I know which mode to use? Well, to some extent you are limited when replying to other signals, but that should not prevent you from calling CQ using a more appropriate mode, specifically one designed for the conditions you are expecting. Nor should it prevent you from requesting a mode change from the other station. You could check out my book for advice, but to give you a quick answer, try CMSK31 for LF/MF, DominoEX for 80/40 m (works great on 80 m even during the day and has amazing NVIS properties), PSK31 for 30 and 20 m short-haul, and MFSK16 for long-haul on 20 m and above. These are all chat modes with reasonably slick and simple operation.

Why have I left out other modes such as MT63 and Olivia? I have done so simply because on analysis, these modes don't stack up. MT63, while seeming to be very sensitive, is in fact not; it just seems that way because it is robust and sounds like noise. Olivia is sensitive and robust, but very slow in change-over (very long latency), and both of these modes are unjustifiably broad. I published a graph some years ago in this column and on my website[6], and which has been widely copied elsewhere, which shows the relative bandwidth of a range of signals compared with the typing speed. Olivia and MT63 are much the worst, at around 10Hz per word per minute. As you can imagine, PSK31 scores well (under 1 Hz/wpm), but so also do the DominoEX modes, even better than RTTY at 3.3 Hz/wpm.

Sensitivity, multi-path performance, and bandwidth efficiency aren't the only factors to consider. Ease of tuning and turn-around speed are important too. Modes with very high redundancy (strong error correction) such as MT63 and Olivia tend to cope much better with burst noise, splatter and fades, but pay for this ability in latency and bandwidth.

Finally on this subject, I've been in contact with Nils DK8OK recently. He has written a paper (with some help from me and others) where he compares the performance of nine chat modes under four different propagation conditions. He uses my method of assessing readability as 'good copy' with up to 10% character errors, 'difficult copy' up to 30% and 'impossible' beyond that. It's worth a read (and is in English). His results indicate performance against sensitivity, which can at times be misleading, as very often signal strength or signal / noise ratio is the least of the problems. The bandwidth and latency of the modes are not considered, except that he has an adapted version of my bandwidth vs data rate graph. The modes tested include two of my designs, MFSK16 and DominoEX, and they come out pretty much as I would have expected.

Nils also uncovered an interesting difference in decoding performance between different computer programs. He tested only RTTY, but it would be interesting to see this work extended to other modes. Nils' paper is worth a read; if you'd like a copy, send me an email.

### New DDS and MEPT controller

I've just completed a new version of the serial controller program for the FEI FE-5650A and FE-5680A Rubidium Synthesizers. This version has a graphics display (shows the pattern being sent), and has drop-down menus, allowing you to change the pattern or the settings (speed, step size, carrier frequency) on the fly. It also has real-time control to allow it to send a carrier, or pattern, and to turn it on and off. You can also transmit inverted patterns (for LSB viewing). The software also looks attractive and is Windows 7 compatible.

The FE-56xx synthesizers are rather nice, as they have Rubidium source stability and accuracy. The programmable types are hard to find these days. Once suitably adapted, they operate from 1 kHz to 15 MHz in 10 mHz steps, and are accurate to 1 part in $10^9$ within five minutes from cold. I regularly use mine as a MEPT on 600 m and for Frequency Measuring Contest practice sessions.

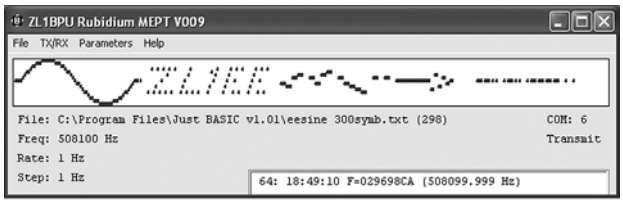


*Figure 3. The new MEPT controller.*

Let me know if you'd like a copy of the software. The plan is to also release versions for other controllers, such as the N3ZI DDS synthesizer. This conversion process is fairly straightforward, as the program remains largely the same; just the communications protocol changes.

### Miniature video cameras

Perhaps this has little to do with radio, and even less digital radio, but I was recently given a really cool toy. It's a video camera the size of a small key fob (50 x 30mm), and it weighs only 16 g. In movie mode (AVI) the images are 720 x 480 pixels and 30 frames/sec, with audio, filling memory at 90 MB/min. Still mode (JPG) pictures are 1280 x 960 pixels. The camera takes a Micro-SD card, and a 4 GB card will record video continuously for over 40 minutes. There is of course no viewfinder, no focussing, and controls are basic.

Well now, I am sure you can think of a million ways to use a cheap (US$16!) very small, very light camera with remarkable picture quality. For example attach it to a long pole and have a close look at your antenna, or check the grass growing in the house gutters. You could attach it to your RC helicopter or racing car, or your bicycle, horse-riding or skiing helmet. They are widely used with RC model aircraft, and even under water. Several models of differing quality and specifications are available. Mine is a #3. I believe they are made in China from surplus market cellular phone parts.

I wanted to try taking photos from a kite, and even in the quick test-flights I've made so far, have been wildly successful. I secured the camera to the different kites using rubber bands, and wisely added a safely line in case it flew off (as it has on one occasion). The picture below was captured in movie mode with the camera mounted pointing backwards above a small (500 mm square) single-line kite, and was taken from a height of about 40 m. You can see the kite and its tail in the foreground. Note the movie timestamp, which can't be turned off.

Some of the kite movies I have taken are pretty wild flights; especially those on a sport (steerable) kite, and the sound effects are amazing. There are some shots with the camera completely upside down, so I'm glad I wasn't aboard myself. I can't wait to send some of these kite photos on using SSTV or ZL2AFP's NBTV!

### References


[1] <www.telephonesuk.co.uk/speaking_clock.htm>
[2] NZ 0900 45678
[3] <www.lux-aeterna.com/>
[4] Pathsym by Moe Wheatley AE4JY, <www.moetronix.com/ae4jy/pathsim.htm>
[5] Digital Modes for All Occasions, RSGB 2002, ISBN 1 872308 82 8
[6] <www.qsl.net/zl1bpu/MFSK/bweff.gif>

*Figure 4. The 808 #3 key-fob camera.*

*Figure 5. Aerial view of suburban Waiuku.*

# Contests

Contest Manager: Frank Hunt ZL2BR
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### Oceania DX Contest

This is the contest where we, and the other stations in the Oceania area "put on a show" for the rest of the world. No matter what sort of station you have or how great an operator you are, you can be assured that the rest of the world will be queuing up to work you! So give it a go!

### Dates and times are:

Phone: 08:00 UTC Saturday 6 October to 08:00 UTC Sunday 7 October 2011

CW: 08:00 UTC Saturday 13 October to 08:00 UTC Sunday 14 October 2011

Full results of the 2011 contest as well as the rules for the 2012 contest and other information regarding the contest is available at: <http://<www.oceaniadxcontest.com/>

### Memorial Contest 2012:

It was great to see that the numbers of active ZL calls and logs submitted were up on last year. However the percentage of submitted logs compared with active calls was once again still only around the 35% level.

More logs makes the log checking job easier; not harder! This year only eleven paper logs were received, all the rest were in a variety of computer file formats; plain text (txt), MS-Word, MS-Excel, PDF, JPG and CSV. Plain txt files are the preferred format, but I'll take whatever you have.

In the May/June edition of *Break-In*, I asked for ideas regarding the status and the future of the Memorial Contest. Thanks to those who have already sent me their thoughts. Of course I'm still hoping to receive some more ideas, suggestions and thoughts. In a later *Break-In* Contest column I will collate all the suggestions received and put forward a "where to from here" proposal based on the suggestions received.

### Sangster Shield 2012:

*(Report and results from Glenn, ZL2KV, Sangster Shield Contest Manager)*

Thanks to all who took part this year. Numbers were up on last year but it seems many ( like myself) operated for only part of the time. Logs were received from 16 operators out of 21 active calls.

Congratulations to Sid ZL2BIF (Opotiki) in winning the Sangster Shield – his first time on the podium – well done. Bill ZL3VZ (Blenheim, operated near Portage both nights) is second and Barry ZL2LN (Motueka) 3rd.

Once again South Island stations fill 2 places in the Open Section.

Bill ZL3VZ also takes the Arthur Stevens Trophy as top South Island Station with seasoned entrants Barry ZL2LN runner up and John ZL4IM 3rd.

Wellington Branch 50 entered 4 logs this year and wins outright the Branch award.

There were also no newly licensed entrants for the Transistor Trophy. (Since there have been so few awards made in this category I am thinking of re-arranging this Trophy to be awarded to the highest scoring first time entrant in the Contest.) The 12 qualifying active Branches were: 8, 16, 22, 24, 27, 28, 29, 50, 69, 72, 87, 88.

I have deducted Branch 02 (3 entrants made 1 contact each with ZL1WAL), Branch 79 (1 entrant contacted ZL1BKI) and Branch 56 (1 entrant contacted ZL3UJZ). As always I have not deducted the contact points, just the multiplier claims. The 1st and 2nd Open Section positions reversed after making these changes. Gilbert ZL3UJZ was recorded as 2 watts – same as last year and maybe he gave up early this year due to conditions on Saturday night, likewise ZL1BKI was recorded as 1 watt and was logged only in the first ½ hour on Saturday.

No stations were logged over 5 watts this year. A small number of VKs were worked but numbers worked had no influence on the results. Three stations worked LU5YF (Argentina).

### Comments received:-

- Conditions poor on Saturday, much better Sunday
- Weak signals Saturday, heavy QSB. Sunday OK till 2200, then gradually weaker
- Getting less each year. Noisy

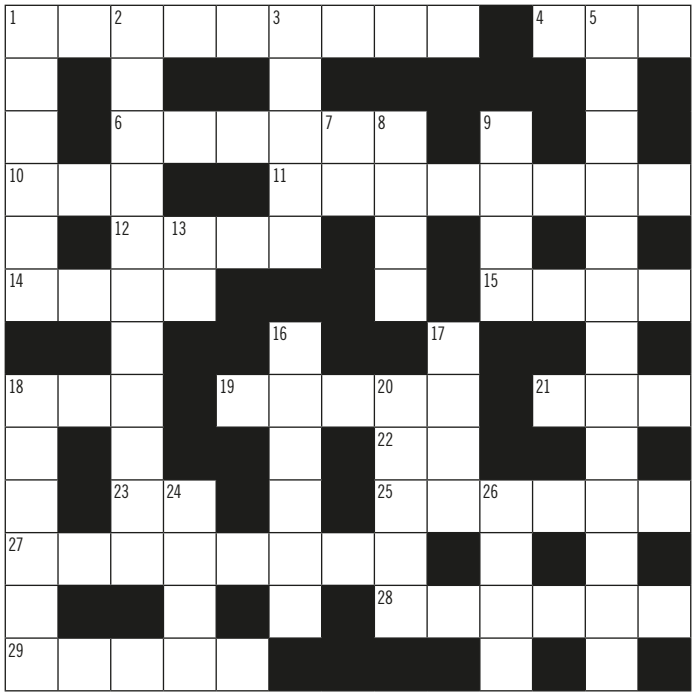
**Memorial Contest 2012 – Results**

| Call-sign | QSO CW | QSO SSB | Pfx CW | Pfx SSB | Score |
|---|---|---|---|---|---|
| **Mixed - Phone and CW:** | | | | | |
| ZL1AJY | 77 | 211 | 7 | 9 | 5840 |
| ZL3VZ | 83 | 152 | 7 | 7 | 4452 |
| ZL2LF | 87 | 146 | 6 | 7 | 4160 |
| ZL2AUA | 81 | 135 | 7 | 6 | 3681 |
| ZL2AUB | 63 | 126 | 6 | 5 | 2772 |
| ZL1ALZ | 47 | 79 | 5 | 8 | 2422 |
| ZL4IM | 48 | 78 | 5 | 5 | 1740 |
| ZL2AQL | 50 | 102 | 3 | 5 | 1616 |
| **Phone only:** | | | | | |
| ZL2TZE | | 239 | | 9 | 2151 |
| ZL4RO | | 203 | | 10 | 2030 |
| ZL1IB | | 216 | | 9 | 1944 |
| ZL1JV | | 208 | | 9 | 1872 |
| ZL4GQ | | 179 | | 9 | 1611 |
| ZL3ADW | | 178 | | 9 | 1602 |
| ZL4RMF | | 168 | | 8 | 1344 |
| ZL1YE | | 158 | | 7 | 1106 |
| ZL2KU | | 122 | | 7 | 854 |
| ZL4KJ | | 130 | | 6 | 780 |
| ZL2CC | | 96 | | 7 | 672 |
| ZL3LF | | 129 | | 5 | 645 |
| ZL1BU | | 106 | | 5 | 530 |
| ZL1TGC | | 64 | | 8 | 512 |
| ZL1GKB | | 84 | | 6 | 504 |
| ZL1TPH | | 44 | | 5 | 220 |
| ZL1RON | | 10 | | 2 | 20 |
| **CW Only:** | | | | | |
| ZL2AGY | 106 | | 8 | | 1696 |
| ZL2APV | 116 | | 7 | | 1624 |
| ZL2JU | 97 | | 7 | | 1358 |
| ZL1BWG | 90 | | 7 | | 1260 |
| ZL2ARC | 69 | | 6 | | 828 |
| ZL1WI | 61 | | 5 | | 610 |
| **QRP:** | | | | | |
| ZL1PO | | 164 | | 5 | 820 |
| **SWL:** | | | | | |
| ZL3WX | | 208 | | 9 | 1872 |
| **Australian Stations:** | | | | | |
| VK4GH | | 121 | | 4 | 484 |
| **Check Logs** | ZL1AIH | | | | |

| Place | Station | 0-5W | DX | Bchs | PWr | Total | Branch | Equipment |
|---|---|---|---|---|---|---|---|---|
| 1 | ZL2BIF | 123 | 2 | 12 | 5W | 7620 | 72 | Kenwood 820, Sky Wire Loop, Ladder line |
| 2* | ZL3VZ | 130 | 3 | 11 | 5W | 7480 | 22 | Icom IC-706, 80m C/F Dipole |
| 3* | ZL2LN | 123 | 2 | 11 | 5W | 6985 | 24 | Yaesu FT847, 80/40 Trapped Dipole |
| 4 | ZL2AGY | 119 | 0 | 11 | 5W | 6545 | 87 | Elecraft K3, Inv V 10m up O/W fed. TR4W Log |
| 5 | ZL1BWG | 91 | 0 | 12 | 5W | 5460 | 28 | K'wd 120V, G5RV, Marconi Admiralty Key |
| 6 | ZL1AIH | 95 | 2 | 11 | 5W | 5445 | 29 | Elecraft K2, 80m 1/4w vertical |
| 7 | ZL2AOH | 96 | 1 | 11 | 5W | 5390 | 50 | Kenwood TS-120-V. Dipole |
| 8 | ZL2AEL | 93 | 0 | 11 | 5W | 5115 | 69 | Kenwood TS-570D. 5 Band Hygain Vertical |
| 9 | ZL2KZ | 69 | 1 | 10 | 5W | 3550 | 50 | H/Brew valve xcvr, BLY87A final, 1/2w dipole |
| 10 | ZL2AQL | 75 | 0 | 9 | 5W | 3375 | 88 | Yaesu FT101Z, FTC-902 Tuner, Dipole Ant. |
| 11 | ZL2BHD | 67 | 0 | 10 | 5W | 3350 | 87 | Yaesu FT7B. 80m Horizontal Loop |
| 12 | ZL2ALJ | 50 | 1 | 10 | 5W | 2600 | 50 | TS120S, End Fed 130' Wire Antenna |
| 13 | ZL2JU | 41 | 0 | 10 | 5W | 2050 | 16 | Elecraft K3. Emtron tuner, 80m o/w fed Dipole |
| 14* | ZL4IM | 37 | 0 | 9 | 5W | 1665 | 8 | TS850s. 2 half waves in phase 80' up. |
| 15 | ZL2BIT | 18 | 0 | 9 | 5W | 810 | 27 | Not advised |
| 16 | ZL2AKW | 19 | 0 | 6 | 5W | 570 | 50 | JRCNSD-515 |
| 1 | ZL3VZ | 130 | 3 | 11 | 5W | 7480 | 22 | Icom IC-706, 80m C/F Dipole |
| 2 | ZL2LN | 123 | 2 | 11 | 5W | 6985 | 24 | Yaesu FT847, 80/40 Trapped Dipole |
| 3 | ZL4IM | 37 | 0 | 9 | 5W | 1665 | 8 | TS850s. 2 half waves in phase 80' up. |

# ZL Crossword No.18

*Compiled by Graeme Hunt ZL1ANH*



***Across***

1. Frequency name 3 – 30 GHz (9)
4. and 17 down. Be strong, Maori (3, 4)
6. Time portion (6)
10. Formed in 1919 and prominent in the "troubles" from the 60's, initials (3)
11. Valves usually used in linear amplifiers (8)
12. High school discipliner in the good old days (4)
14. To give off (radiation or particles) (4)
15. Phonetic alphabet, $10^3$ (4)
18. Kettle potato chips manufacturer and 7th Greek letter. (3)
19. By jove, no bull in this store (5)
21. Methamphetamine, slang (3)
22. Home of Nokia, prefix (2)
23. Symbol for Curium and also less than ½ inch (2)
25. PNG port, affected by volcanic eruption in 1994. (6)
27. Variable resistor (8)
28. Person's name. (6)
29. Amateur radio manufacturer since 1959, originally named General Television Co. (5)

***Down***

1. Frequencies just above 2MHz (6)
2. µF, nF, pF (11)
3. and 9 down. ZL DXer and contest manager for many years. Field day contest bears his name. Surname first. (5, 4)
5. Those doing this crossword are these (13)
7. Young person's trip, maybe visit Vienna, prefix. (2)
8. Tone access for the repeater, abbr (4)
9. See 3 down
13. Used to indicate location. (2)
16. Resistors across meters for lower current (6)
17. See 4 across
18. = $mc^2$ (6)
20. Short path to Banaba Island (5)
24. Clean the bathroom floors with these (4)
26. 160 m Top _ _ _ _ (4)

*Answers on p40*

atmospherics

- ZL4s absent Sunday. No publicity of this contest
- From a first timer; 'Where were the VKs and ZL4s?"
- Usual Stalwarts only. Noisy Saturday, QSB Sunday
- Disappointing number of contestants. Suggest promoting in "*Break-In*" and "*Info Line*".

From one comment received, please note that a DX contact is scored at 10 points, regardless of power used by the DX station. It is only necessary to record call-sign and reported RST for each contact to claim the 10 points.

**Straight Key Night:**

Polish and lubricate that old Morse key and enjoy an evening of old time radio fun. An activity night in which everyone can be a winner, with a certificate to prove it.

**When:** Sunday November 4th 2012 - 2000 - 2200 NZST.

**Band:** 80 m (3.5 MHz) only.

**Mode:** CW sent with straight key i.e., characters formed manually, no system of automatic dots, dashes or spacing permitted.

**Divisions:** Vintage QRP, Vintage QRO, Open QRP, Open QRO, QRP 5W or less RF output.

**Explanation:** Vintage receiver and transmitter or transceiver using valves, no solid state devices in the signal line permitted.

**Exchange:** RST/QTH/operator's name (one word)/key used (e.g.ZC1, P&T)/Tx type (e.g. ZC1, FT1000, homebrew)/Tx power (watts). (Except for DX stations (i.e. non ZL mainland) only RST, operator's name and QTH need be exchanged)

**Scoring:** 1 point per QSO Stations may be worked once in each hour CW to CW only. All stations submitting logs must use a straight key throughout, but straight key stations may QSO stations using bugs, electronic keyers or keyboards.

**Multipliers:** Multiply total points as follows: Vintage QRP x2, Open, QRP x1.5, Vintage QRO x1.2, Open x1.

**Logs:** Each log entry to show: Time (NZST or Z), call-sign, RST, QTH, name, key type, Tx type, Tx power (of station worked). Calculate total score, multiply to give total score claimed. Logs to have associated data sheet giving entrant's name, call-sign, QTH, age (optional), full details of equipment used, i.e.key, Tx/Rx, Tx power, antenna.

Send logs by email, mail, on or before 20 November to: Ken McCormack ZL1AIH, 181 Ararimu Valley Road, Waimauku, Auckland 0882 or E-mail <zl1aih@xtra.co.nz>

Certificates will be sent to the top three stations in each Division (including DX entrants who send in logs). All other entrants will receive a personalised certificate if an A4 self-addressed envelope is sent to the Straight Key Night Manager. Any photos of operators and/ or equipment gratefully received.

**Activity Summary**

| Section | Calls | | Logs | |
|---|---|---|---|---|
| | 2012 | 2011 | 2012 | 2011 |
| ZL CW only | 15 | 9 | 6 | 6 |
| ZL SSB only | 58 | 57 | 17 | 12 |
| ZL CW & SSB | 15 | 11 | 8 | 8 |
| ZL QRP | 1 | | 1 | |
| ZL SWL | | | 1 | |
| ZL Total | 89 | 32 | 77 | 26 |
| VK | 58 | 77 | 1 | 4 |

**International HF Contest Calendar for October/November 2012**

| | | | |
|---|---|---|---|
| Oceania DX Phone Contest | Oct 6/7 | 0800UTC Sat-0800UTC Sun | <www.oceaniadxcontest.com>>> |
| Oceania DX CW Contest | Oct 13/14 | 0800UTC Sat-0800UTC Sun | <www.oceaniadxcontest.com> |
| JARTS RTTY Contest | Oct 20/21 | 0000UTC Sat-2400UTC Sun | <http://jarts.web.fc2.com/2012/rules2012.html> |
| Worked All Germany WAG) Contest (CW/SSB) | Oct 20/21 | 1500UTC Sat-1500UTC Sun | <www.darc.de/referate/dx/contest/wag/en/> |
| Ukrainian DX Contest (CW/SSB) | Nov 3/4 | 1200UTC Sat-1200UTC Sun | <www.ucc.zp.ua/urdxc2012rules_eng.htm> |
| WAE (Worked All Europe) RTTY Contest | Nov 10/11 | 1200UTC Sat-1200UTC Sun | <www.darc.de/referate/dx/contest/waedc/en/> |
| Bulgarian DX Contest (CW/SSB) | Nov 17/18 | 1200UTC Sat-1200UTC Sun | <http://lzdx.bfra.org/rulesen.html> |
| CQ WW DX CW Contest | Nov 24/25 | 0000UTC Sat-2400UTC Sun | <www.cq-amateur-radio.com/ cq_contests/index_cq_contests.html> |

# Satellite Orbits

Andrew Barron ZL3DW
<ad.barron@xtra.co.nz>

'SimpleSat Look Down' is a free, easy-to-use software app for satellite tracking. Written by Tom Doyle W9KE it includes a satellite look down window that displays the view from the satellite looking down at the earth as it moves along. It uses .NET 4 and runs on Windows 8, Windows 7, Vista and XP. Tom has released a collection of videos that explain how SimpleSat Look Down works and they can be seen at: <http://www.tomdoyle.org/SimpleSatLookDown/SimpleSatLookDown.html>

You can download SimpleSat Look Down from: <http://www.uk.amsat.org/?p=8217>

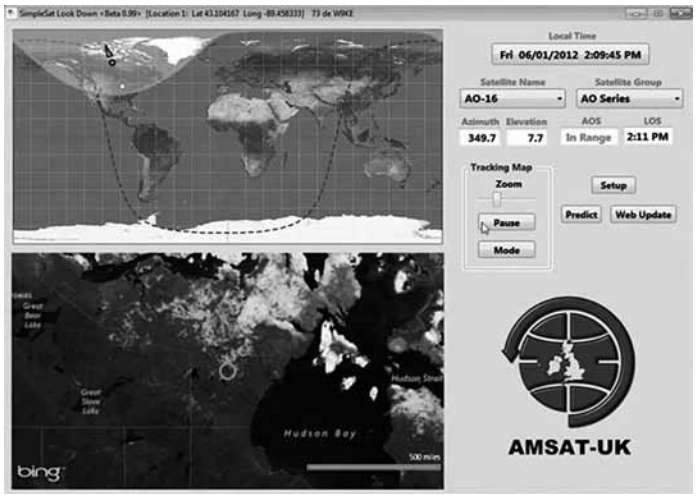
The Japanese amateur radio satellite PROITERES was successfully launched on Sunday, September 9 from the Indian Space Research Organisation (ISRO) Satish Dhawan space centre. The SPOT6 and mRESINS satellites were on the same launch into a 695 km × 695 km, 98.2º inclination orbit. PROITERES was built by a team of students and faculty members of Osaka Institute of Technology (OIT) and the spacecraft aims to demonstrate powered flight using a Pulsed Plasma Thruster (PPT) engine. PROITERES stands for PRoject of OIT Electric-Rocket-Engine Onboard Small Space Ship and will transmit on 437.485 MHz FM/AFSK. The spacecraft carries a camera and the two CPU's run the Linux operating system. The amateur radio call-sign is JL3YZK. This type of research is of interest as future ham satellites may be able to use this kind of engine to boost Cubesats into higher orbits, which means wider coverage and more time available each pass.

Israeli Students are developing Duchifat-1. The CubeSat will carry an APRS digipeater operating on 145.825 MHz and a UHF/VHF 1200 bps BPSK transceiver that can provide a CW beacon and an FM to DSB transponder. The main mission of the satellite is to transmit real-time information via radio amateur packets from a Low Earth Orbit (LEO) using the Automatic Position Reporting System (APRS) protocol. Duchifat-1 will allow travellers to access the satellite for worldwide position/status reporting and messaging even in the case of using simple handheld or mobile radios with omni-directional whip antennas. Due to the lack of APRS digipeating coverage on the 145.825 MHz frequency remote travelers, ships at sea, and stations in many parts of the world are presently unable to use the APRS system. The Duchifat-1 satellite will augment the existing worldwide terrestrial Amateur Radio APRS by adding LEO satellite coverage along with the International Space Station APRS digipeater.

ARISS has provided an update on the status of the 145 MHz amateur radio transceiver in the Columbus module of the ISS. In the July 17 ARISS meeting Kenneth Ransom N5VHO reported that his group is in the final stages of preparing the certification for flight of the replacement hardware for the degraded Ericsson VHF [145 MHz] radio. The Ericsson rig is part of the 2nd ISS amateur radio station that is located in the Columbus module. The team had hoped for a launch of the equipment on flight 33-S [Dec. 5], but it may be launched on flight 49-P [Nov 1], which is a month sooner than 33-S. The team is endeavoring to finish the certification in time for this earlier flight option. The degraded Ericsson VHF radio may be returned on flight 32-S in October. The team is very interested in trying to determine what the problem has been with this radio.

The HTV-3 cargo vessel carrying five CubeSats blasted off on an H-IIB rocket to the International Space Station (ISS) in the early hours of Saturday, July 21. Onboard were four amateur radio CubeSats; F-1, WeWish, FitSat-1 and TechEdSat along with a scientific CubeSat called Raiko. The CubeSats will remain on the ISS until mid October when they will be deployed by Japanese astronaut and radio amateur Akihiko Hoshide KE5DNI using the ISS Kibo robot arm. The F-1 CubeSat carries a pair of Yaesu VX-3R handheld transceivers to provide communications on 145.980 MHz and 437.485 MHz FM using AX.25 packet radio data. FITSAT-1 will carry an Optical Communications experiment that aims to write Morse Code across the night sky, although only when in range of Japan. It will also transmit CW on 437.250 MHz, FM AX.25 data on 437.445 MHz and high speed data on 5840.00 MHz. We-Wish will transmit on 437.505 MHz FM AX.25 data. TechEdSat will transmit on 437.465 MHz and will also communicate via the Iridium and Orbcomm satellite phone networks, a first for a CubeSat.

*At exactly at 9.51 a.m. September 9th, the rocket – Polar Satellite Launch Vehicle-C21 (PSLV-C21), standing around 44 metres tall and weighing around 230 tonnes, hurtled towards the skies ferrying the two foreign satellites – SPOT 6, a French earth observation satellite weighing 712 kg and 15 kg micro-satellite Proiteres of Japan. This marks the 100th successful launch for the Indian space centre.*




*A screenshot of the 'SimpleSat look down' program.*

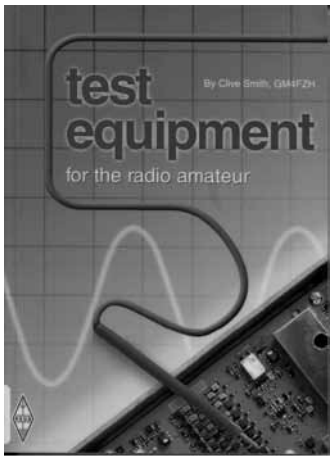
I have been asked to include an active satellite list, but this is difficult due to the month delay between the deadline for *Break-In* copy and date that it is published and in your mail box. For up to date information it is better to check the AMSAT status page at <http://www.amsat.org/amsat-new/satellites/status.php> and the KD5QGR Oscar satellite status page at <http://oscar.dcarr.org/>

AO-07 Oscar 7 seems to be active about 50% mode A and 50% Mode B (UV). VO52, FO-29, SO-50 (VU mode FM), and ISS digital / APRS, are active. Hope Sat HO-68 has transponder failure and only the beacon is still working, same with Delphi C3. Sara Lily and Emma (FO-69 and FO-70) have active beacons. We hope that the digipeaters will be turned on for ham use some time in the not too distant future. There are also many cube sats with active beacons / telemetry, check the AMSAT web page for details.

The Tethersat-1 and 2 satellites are designed to test Electrodynamic Tether Propulsion. The amateur radio

Book review

# Test Equipment for the Radio Amateur 4th edition




**By Clive Smith GM4FZH**
**Published by RSGB 2011, 250 pp, ISBN 9781 9050 8672 6.**
**Price £stg 14.99.**
*Reviewed by John Walker ZL3IB*

*For a long time I have thought that constructing simple test gear is one of the most fruitful areas of home-brewing remaining to radio amateurs. I know that I have found it to be so. Consequently I was delighted to see the appearance of a fourth edition of 'Test Equipment for the Radio Amateur'. Many of the circuits and designs included are taken from RadCom and/or ARRL publications.*

This new edition follows the same basic format as the earlier versions but it is much wider in its scope which makes it really useful. For example Chapter 1 covers several aspects on safety of equipment in the shack and field. Chapters 2 and 3 cover Meters and Measurements and Oscilloscopes with useful ideas for probes, etc. Component measurements are covered in Chapter 4 but the transistor tester designs are a bit basic. Chapter 6 will be helpful to VHF/UHF users since it deals with RF Samplers and Couplers.

A simple PIC-based frequency counter and a GPS derived frequency standard are described in Chapter 7 whilst wavemeters and analysers are covered in Chapter 8; I found the discussion on spectrum analysers particularly interesting. Chapter 10's coverage of modulation measurements was new, and includes deviation and gain compression meters. This Chapter is followed by a chapter covering both the theoretical and practical aspects of antenna and transmission line measurements; this one is probably the most relevant to most radio amateurs. Circuits provided include SWR and return loss bridges.

Signal sources are necessary for setting up and adjusting receivers and transmitters and these are described in Chapter 12; circuits are provided for LF, HF and VHF/UHF/GHz signal sources. Chapter 13 provides a useful introductory guide to noise measurement for both receivers and transmitters together with designs for suitable test gear such as a SINAD meter.

Chapter 14 provides a useful compilation of a wide range of software–based test equipment and programs whilst chapter 16 concludes with an interesting 'pot pourri' of circuits including a audio level meter, temperature meter, Morse speed calibrator, etc. Appendix 1 is full of useful reference data whilst Appendix 2 provides PCB and component layouts for many of the projects. There is a comprehensive index.

I enjoyed reviewing this book and would recommend it to any ham who enjoys 'home-brew' projects. The book is well-presented although some of the circuit diagrams could do with being larger. βi

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satellite Tethersat is a 3U CubeSat that splits into two joined by a 1 km tether to test electrodynamic tether propulsion. Both spacecraft will use 9600 bps AX25 GFSK packet downlinks on UHF. A launch is planned on ORS-3 in July 2013 from the Wallops Flight Facility on Wallops Island, Va. Electrodynamic tether propulsion has the potential to make space travel significantly cheaper. It is a simplified, very low-budget magnetic sail. It can be used either to accelerate or brake an orbiting spacecraft. When direct current is pumped through the tether, it exerts a Lorentz force against the magnetic field, and the tether accelerates the spacecraft. Potentially this technique could be used to raise the orbit of a satellite from 600 to 1000 km using a Ward Spiral maneuver. See the 2009 paper Tethered Satellite Dynamics, Mission Design and Applications by Chadwick Healy <http://ccar.colorado.edu/asen5050/projects/projects_2009/healy/>, Wiki <http://en.wikipedia.org/wiki/Electrodynamic_tether>

As always I am keen to hear about and publish details about your satellite activities, so please drop me an email to <zl3dw@nzart.org.nz> and photos are especially useful. I am also very happy to answer any questions that have you puzzled or will help you get started.

73 *Andrew ZL3DW*

## FMTAG – Frequency Management and Technical Advisory Group

Secretary: Doug Ingham ZL2TAR
<fmtag@nzart.org.nz>

### Proposals

Branch 34 South Canterbury has applied for a 144.575 MHz Digipeater on Mount Studholme, located at TOPO50 CA18 352.25 531.31. An engineering investigation, in accordance with RSM PIB38, confirms that there will be no interference to other stations.

Branch 63 Upper Hutt has applied for a 6 metre repeater on Mount Climie, located at TOPO50 BP32 798.83 423.94. The repeater transmit frequency will be 53.950 MHz and the receive frequency 52.950 MHz. An engineering investigation, in accordance with RSM PIB38, confirms that there will be no interference to other stations.

### Final recommendations to NZART Council

NZART Council has approved the following applications, published as Proposals in HQ InfoLine:

Branch 18 Hutt Valley. Power increase of its 700 repeater at Fitzherbert, located at TOPO50 BQ32 644 351.

Branch 30 Otago. Relocation of its 830 repeater to Halfway Bush Road, located at TOPO50 CE17 010.08 178.44.

Branch 30 Otago. Relocation of its 146.25 MHz link station to Halfway Bush Road, located at TOPO50 CE17 010.08 178.44.

Branch 30 Otago. Power increase of its 665 repeater at Highcliff, located at TOPO50 CE17 132.79 162.56.

ZL2VBO. 144.575 MHz Digipeater on Mount Burnett, located at TOPO50 BN24 696 014.

ZL3ADT. 50.040 MHz Beacon at Rolleston Railway Station, located at TOPO50 BX23 503 737.

### Comments and applications

Please send your comments and suggestions on the above matters, and on any other FMTAG matters, by e-mail to: <fmtag@nzart.org.nz>

Applications for repeaters, beacons, digipeaters, point-to-point links, and so on, should be made on the latest version of FMTAG Form 10. The latest versions of FMTAG Form 10, and the explanatory Form 10A, are available on the NZART website: <http://www.nzart.org.nz/fmtag/index.html>

Completed forms should be sent by e-mail to <fmtag@nzart.org.nz>

# Longer Wavelengths

Con Wassilieff ZL2AFP
<zl2afp@nzart.org.nz>

### Robert Milne VK7ZAL SK

Robert Milne VK7ZAL became a Silent Key on the 21 of June 2012, aged 72. Using the scientific call-sign AX2TAR Robert was the first VK have a two-way VK/ZL LF contact on 177 kHz with ZL3FJ in 1997, using CW. This contact was over a distance of 1940 km (Tasmania). Robert also had several two-way CW contacts with ZL1WB, over a distance of 2430 km.

### Factors in RF earthing for a ZL2CA inverted L antenna

Bob ZL2CA has been using variants of inverted L antennas for transmission since an LF band was introduced, and more recently on the 600 metre MF band. He writes:

"While it is somewhat of a challenge to obtain a reasonably low RF resistance value for an electrically small antenna, it is worth experimenting to get the resistance as low as is practicable as that results in higher antenna current and better signal reports. Back in the 1980s bare copper wire was laid out in nominal radial fashion, mostly 50 mm below lawn surface or otherwise "out of the way". In all 13 wires provide coverage of most of the suburban section. 80 metre DX is good using a vertical driven against the radial wires, but other bands can also be tried, like using an inverted L with the upwire at the star point of the radials.

"For 600 metre transmission it was noticed that for the same transmitter power the antenna current is moderately higher in winter than summer and that was the stimulus for an investigation into possible reasons for change. Most amateur LF/MF antennas give reduced performance when it is raining, as insulation is challenged and near field absorption by trees and houses is likely higher, so to reduce the influence of wet conditions the investigation for summer/winter variation was based on measurements made during dry conditions (above ground). A 5 kVA isolating transformer is used for shack mains power, to isolate mains earth from the shack RF earth and also to hopefully break the path of mains borne QRM.

"For LF and 600 metres higher antenna current is achieved when a jumper wire bridges main's earth to RF earth. The jumper could also carry 50 Hz current as the buried bare copper radials are better for bonding to the mass of earth than one driven rod for house safety earth. A 1 µF metalised polyester capacitor in series with the jumper basically blocks 50 Hz current but is like a short for LF and MF, and in practice there is no change in 500 kHz antenna current when the earth jumper is used and the capacitor is shorted out. Impedance measurements were made with a miniVNA Pro that is trusted for good accuracy and repeatability, and is certainly good for differential values when different arrangements are measured during the same session. The following table gives the series resistance component looking in to the cold side of loading coil at the base of the upwire, all tuned for 500 kHz (zero series reactance component) for a test frequency of 500 kHz.

| Condition | Only RF radials | Mains earth jumpered |
|---|---|---|
| Summer | 14.5 Ohms | 12.0 Ohms |
| Winter | 14.0 Ohms | 10.9 Ohms |

"At 500 kHz the jumpering to mains earth is mostly a resistive change. The inverted L antenna is electrically short, capacitive reactance nominally $-j800$ so that dominates tuning (Q about 60). From the measured resistance changes it was calculated that the effective resistance of mains earth, as connecting in parallel with the RF earth, is 70 Ohms in summer and 49 Ohms in winter. Radials alone result in some 14 Ohms (including a loading coil), so earns its keep for securing reasonably effective performance over all seasons. Of the seasonal differences, it is the effective resistance (at 500 kHz) of the mains earth that has most affect on antenna system resistance.

"The mains earth (which is strapped to neutral at the switchboard) goes to a driven earth rod beside the house as well as via an overhead cable to power lines on the street, then collectively to other houses and the substation, so it is the longest "electrical length" of any wire influencing the inverted L antenna. What effect the driven earth rod for the house switchboard has was checked by temporarily separating the wire from the rod, and it gave no change to the resistive component of the antenna (note that mains safety was maintained during this test by jumpering mains to RF earth, this time with no blocking capacitor). The implication is that a driven rod is "useless" for 500 kHz "earthing" and it is the counterpoise effect of radials and generally connected wires that dictate how low the input resistance of the antenna can be, noting that copper wires are much lower resistance than any soil. Water has relative permittivity of 81, so damp soil is much more "capacitive" than dry soil, so a more likely explanation is higher capacitive association with ground for overhead mains wires in winter is behind the change in 500 kHz resistance from 70 Ohms in summer and 49 Ohms in winter."

### Redifon NBD transmitter saga

In the last column I described my plans to modify a Redifon Solid State Beacon model BK125 for amateur use on the 600m band. Since then I have been removing extraneous circuits and making necessary repairs and finally got the transmitter operating. Unfortunately this pleasant state of affairs did not last long because a single transistor in the –10 V regulator decided it was time to meet its Maker. The result of this was a dramatic increase in the –10 V rail and subsequent catastrophic extermination of many components in one of the two driver and power amplifier boards. The power output is now a quarter of the original (30 W), due to the nature of the operation of a full H-bridge amplifier.

It is possible that other tired components will eventually fail and so the future for the BK125 looks bleak. The irony is that there were so many fail-safe circuits to protect the transmitter against most external influences, but none to protect it from "fifth columnists". I shall retain it in its present state as a historical curiosity rather than a practical working transmitter and return to building a new 600m transmitter from scratch.

*Some background from the BK125 designer;*

I had the pleasure of corresponding with the designer of the BK125, David Birt, who had a most interesting story to tell about the development of the BK125. David was a pioneer in switch mode amplifier techniques. I have his permission to reproduce his comments, an extract of which follows:

"I am delighted to hear of interest in the BK125. A little background as to how the BK125 came to be might be of some interest? The beginning of my interest/association with class D started around 1962 when I was working on TV receiver techniques at the Applications Division of Mullard (Philips) research labs. Primitive germanium transistors had started to be made, and I had been part of the team which developed, and then demonstrated, a fully solid state receiver with 17″ bright picture at the "Radio Show" in London. Subsequently, in 1959 the head of department gave a paper to the Television Society in which he stated that "there was absolutely no future for transistors in television". I mention this, because it is indicative of the prevailing negativity of the time, and a comment on British management which helps explain why industry has largely disappeared from this island.

"Like my proposal to make amplifiers out of switches. Birt is a fool, get rid of him. My colleagues designing audio amplifiers, had essentially unplugged the valves and plugged in transistors using the same circuit topology, and I remember a published design of a "Public Address" amplifier producing ½ watt output at 10% distortion; deemed to be "adequate".

"Against fierce opposition, I eventually got permission to publish an article in *Wireless World* "Modulated Pulse Audio Amplifiers" (1963?) on the understanding that there would be no hint that I had any association whatsoever with Mullard/ Philips. By that time, I had built a class D amplifier during lunch breaks which produced music, and therefore aroused some interest in passers-by

walking along the corridor.

"I then changed jobs and joined the short-lived Redifon research group. I had been interviewed by Rog, the unofficial chief engineer (who sadly died earlier this year aged 99). Redifon didn't have an official Chief Engineer, because they didn't really like the idea of engineers having any say. But Rog had read my article, and did enable me to spend a few weeks looking into an idea I had for class D at RF, and to file a patent. What had attracted me to class D was that the theoretical maximum efficiency is 100%, irrespective of load phase angle (closely approached in practice), and linearity. If you look at the spectrum of a modulated pulse, on the left there is the baseband component DC + audio, but there are also modulation sidebands around the pulse repetition frequency and its harmonics. A passband filter can extract this modulated carrier. For linear AM, replace the conventional sawtooth/ triangle input to the pulse modulator with a cusp waveform derived by full-wave rectifying a sinewave having the desired carrier frequency. I built a demonstration rig using valves(!) which worked quite well up to about 85% modulation. So far as I know, this scheme has never been used commercially.

Meanwhile, in Redifon comms lab, attempts to produce a solid-state version of the current NDB valved transmitter had been going on for a couple of years without success. I had tried to convince "management" that class D could be the solution but the idea met fierce opposition, and I was not allowed to do any work on it. However, I had been tasked with designing a switch-mode (class D) power supply. Class D was OK for power supplies, because other people were doing it! There were sound technical reasons for selecting a frequency of 600 kHz for this, but there was also an ulterior motive! This power supply could very easily be used to demonstrate 100 Watts of RF, and even light a 100 Watt lamp. This from a pair of TO5 transistors with minimal heatsinking.

"The response of the then Managing Director could be described as "digital": it went from fully *OFF* (anti) to fully *ON*! This is how the BK125 came to be. The prototype was promised to the Civil Aviation Authority in Iceland in 6 weeks time!! Of course we didn't manage it within 6 weeks, but not much more. So the whole thing was a terrific rush. I use that as my excuse that the circuit topology was a bit stupid in that I followed the tradition in high-level modulators of having the RF power amplifier grounded and the modulator on the high side which required a floating drive, hence the optical couplers. Subsequently, (and in spite of the Company!) there was a logical development up in power to 1kW and up in frequency to 2 MHz for the BT1000 broadcast transmitters (in which the modulators are grounded, and the RF power amplifier drives isolated by simple transformers). I had just one ally, Ted Phelp in Sales Dept, and with his support we won a contract from the BBC/IBA coincident with the wavelength changes in 1978 even though nothing beyond 'back of envelope' sketches existed. That accounted for about 60% of the company turnover.

"Incidentally it (the BK125) was 125, because the MD was a power freak, and it had to be capable of more power than anyone else's beacon, even though such high power could not be used due to international regulations. Hence the power level push buttons on the front!"

David notes that Redifon had another change of managing director who decided that Redifon would not be involved in broadcasting and so he went to work for the BBC Designs Department, where he says he had the happiest period of his working life, working on a project known as 68PAL which was a DPCM scheme for transmitting two PAL channels + n audio channels + data over a standard 144 MB Post office link. All in all an interesting and lively account of the attitude of conservative management towards innovation at the time.

### 600m net

The Thursday evening 600 m net meets weekly, with the co-ordination net on 3666 kHz starting at 8.30 pm. Recent 600 m transmitting stations have included ZL1QM, ZL1BPU (running QRP), ZL2CA, ZL2AFP (also running QRP), ZL3JE, and ZL4MD. Good propagation conditions on 600 m are often not reflected in similar conditions on 80 m.

# Awards

Awards Manager: Alan Chapman ZL3GX
<awards@nzart.org.nz>

At the time of writing this column we had just finished 17 days of looking after 7 year old twins. While it was nice to have them it was even better to hand them back to their mum and dad.

This column is for promotion of awards and at the moment I don't have any details of awards coming up. If your branch has an award that it would like to promote please send me details of the award to the address at the end of this column. There was no awards column last month because I didn't have any awards to publish.

### Rag Chewers' Award

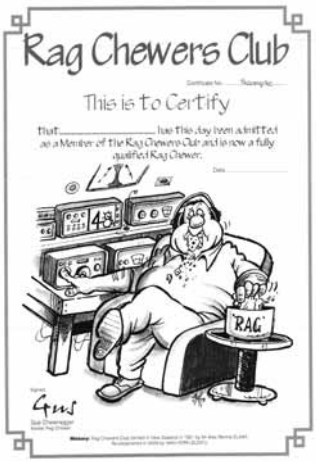
The award is for a non-stop half hour QSO with any station, on any band, or any mode. This award was first introduced into New Zealand in 1931 by Alex Rennie ZL2AR. The certificate is the artist's impression of a "Rag Chewer" and sketched by the well-known cartoonist Jim Hubbard and is professionally printed on gloss paper. A fee of $5.00 is applicable.

Application for the award can be made to: Ivan Horn ZL2ATU. PO Box 7250. Wanganui 4501

### Reefton-Buller Award

Basic Award requires contact with any five Branch 62 Members.

Merit Award requires, in addition to Basic, that ZLs contact one Branch 62 XYL or YL and the club station ZL3BRC while overseas stations contact any of those mentioned above. Two categories HF and VHF.



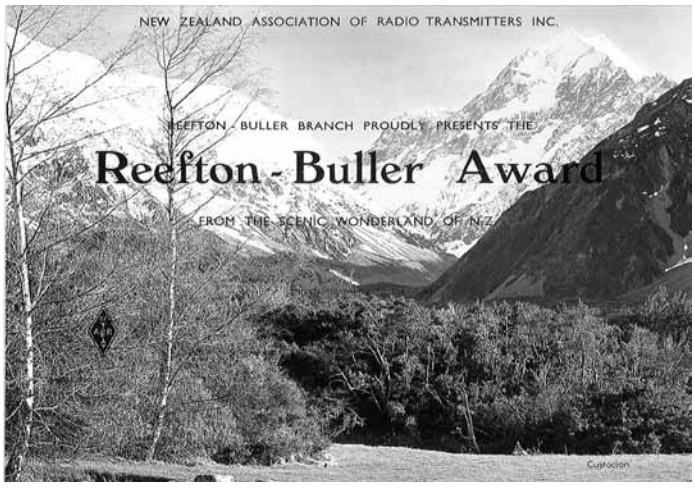

No QSLs required. Send certified list with $5.00 to NZART Awards Manager. List of members, etc, available from Branch 62 Secretary.

### Club Awards

Clubs running short-term awards or new awards should send details of the award to me via email or at my *Call Book* address or the address below. Remember that *Break-In* is only published on even months and copy, including, if possible, a copy of the certificate, for inclusion, should reach me by the end of the even month.

The Awards Net runs on 80 m, 3.677 MHz every night from 0800 UTC every night of the year. Every one is welcome to join in especially if you are mobile and in a rare county or district.

NZART Awards Manager, PO Box 1733, Christchurch 8140 <awards@nzart.org.nz>, <www.nzart.org.nz/activities/awards/>


NEW ZEALAND ASSOCIATION OF RADIO TRANSMITTERS INC.
REEFTON - BULLER BRANCH PROUDLY PRESENTS THE
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*Reefton Buller Award Certificate.*

# AREC – Amateaur Radio Emergency Communications

Geoff Gillman ZL3QR and Bev Gillman ZL3OV

*AREC Mission Statement:*
*To be the preferred provider of Emergency Communications to New Zealand Emergency Services.*

Hi, Everyone. It may come as a surprise to many that AREC was involved in assisting with communications for last year's Rugby World Cup event as is evident by the following report, and there will be further news from the South in the next issue.

### AREC Involvement – RWC 2011, Dunedin

*(Compiled by Bill Olsen, Southern Districts AREC Area Manager, ZL4AE/ZK4EX).*

The New Zealand Police undertook an extraordinary amount of planning in terms of their response to the huge crowds expected to the RWC matches being played in Dunedin. Planning was undertaken by one of the Senior Sergeants who spent a considerable amount of time putting together the Police plan for the Dunedin Area. He held many meetings with various Community groups and maintained a core group of advisors with whom he had regular meetings. I happened to be on this group as a communications advisor.

As part of his plan he had some 100 odd extra staff drafted into the Dunedin district during the four RWC match weekends. Each Policeman had a handheld radio. He determined that as a result of the anticipated heavy traffic on the operational Police radio channels, the "3rd level players", ie.: the Community Patrols, the Maori Wardens, the City Council Security staff, the University Campus Watch and others would intrude into and create unnecessary "non-essential" radio traffic on the anticipated heavily-congested operational channels. He was at a loss as to how to manage these players and at one stage he could not get past using cell phones for these players to contact the operations control room. That had obvious drawbacks so I had a think about it and presented a communications scenario for these players.

There was a resource which had not been taken cognisance of which was the existing Search & Rescue radio network. There would be no cost involved as the Police already own the equipment; it was immediately available with a base radio already installed in the Dunedin "Special Operations Room" and numerous handheld radios and other equipment in the SAR store. And the local AREC Section would manage and operate it; all at a "fiscally neutral" status (free). As soon as the term "free" was mentioned the lights went on, ears pricked up and the answer was "Yes please, do it! Present a plan"!

A committee of 6 local AREC staff, ably led by Lindsey Ross ZL4KS (Branch 30 Section Leader), was formed and met weekly to formulate the plan. In undertaking this task we had to assume that "Murphy" was lurking in the mix somewhere and he would dictate that there would be a bona-fide search initiated right at the most critical stage of this task. (As it happened there wasn't; phew) But we had to make a contingency plan for it. Because we had to take into account coverage into the Mosgiel area, we obtained permission from the Dunedin City Civil Defence to use their permanently established VHF ESB band repeater on the match days, with the proviso that we would immediately vacate the channel should there be a "no duff" civil emergency. We also had to put a contingency plan in place for that.

The overall plan was: take the amateur repeater '665 at Highcliff off the air on the match days and reconfigure it on onto one of the portable ESB band repeater channels. This was our back up operational channel in case we lost the Civil Defence channel.

In terms of the potential SAR operations we had the Police portable repeater available along with a portable base set and a significant number of AREC handheld Icom radios. We also had the Civil Defence Mobile "Emergency Communications Unit" (ECU) on standby. We had sufficient AREC staff on standby for any SAR event.

In terms of the mobile equipment, the Dunedin City Civil Defence loaned us some spare Tait T-2000 radios which they had as a result of a recent upgrade and retained them configured as portable "mobile" sets fitted with cigar-lighter power plugs, speakers and "Mag-Mount" antennas. All programmed with appropriate channels. We fitted these to the Community Patrol vehicles with the other players using handheld radios.

All staff involved in the Police RWC operation (including these "3rd level" players) must attend the mandatory Police briefing during the afternoon of the match days. The radios were issued and temporarily installed in the "Community Patrol" vehicles by AREC staff following this briefing. The radios were returned to the SAR store at the end of the evening activities, typically 0100 to 0200 the following morning.

At the beginning of the operation we worked with two AREC operators in the Control Room alongside and liaising with the Police operations staff, the Fire Service and the Ambulance staff with two technical staff "out the back" at the SAR store doing the installs. After the first two match days we determined that only one Control Room operator was needed, but we worked two shifts (early and late). Once the installs were completed the "technical staff" was stood down until the Community Patrols finished work and returned to have the radios de-installed (a 5 min job)! All loan equipment returned and the '665 repeater was restored to normal operation the next day, all ready to do it again the next match day.

As it happened the crowd was exceptionally well behaved on all match days, apart from the usual local idiots, with the Police having a fairly easy time.

The Police RWC planning staff and the Regional Operations Inspectorate were most impressed with the ability of AREC to mobilise a "scratch" radio network to support intense operations like this. Senior members of the Police Management Team complimented AREC and stated "we will remember this, there may well be other situations where this concept can be used".

The AREC Team was: ZL4KS (Section Leader), ZL4SB (deputy S,L,) ZL4TAQ, ZL4PH, ZL4LDS, ZL4OC, ZL4JH (Deputy A, M), ZL4AE (Area Manger),

### Easter Equestrian Endurance and CTR Event, 2012

In mid-February an item appeared in one of our local community newspapers, which mentioned that the South Island Equestrian Endurance Champs had been held in North Canterbury over Waitangi Weekend.

From previous experience we knew that this particular event is usually a precursor to the National Champs, probably at Easter, so I contacted Richard ZL4FZ / ZK9EA to see if any request for our services (to supply safety comms) had been made, and if not, then to expect a call. Within the following week the call came.

As Easter tends to be regarded as "family time" for a lot of people, it is not easy to get sufficient operators available and it is at such times that the ability to call on the combined resources of the three Canterbury AREC Sections (Ashburton, Christchurch and North Canterbury) are really appreciated. This covered the personel requirements, the only real problem then was the lengthy negotiations with the equestrian people to determine exactly what their needs were, the difficulty being the potential for last minute changes to plans.

The planning was arranged by Richard ZL4FZ (Christchurch) and Don ZL3DMC (Nth. Canterbury) but as both had only limited time available for the event, then I, having had experience of three previous events, was designated as Senior AREC Operator / Liaison.

The events are based on Distance (Endurance) and Distance/Time (CTR) and involve traversing a series of loops of differing sizes, the combination of which designates the total distance to be achieved. Something like seven loops were involved this time, the largest (#1) of 38 km, (#2) 32km and so on. With only three Checkpoints (plus Base) it is obvious that these may be positioned to cover more than one Loop. The distances were 160 km, 120 km, 100 km, 80 km and 60 km with sometimes multiple classes represented, and the courses were a mixture of roads and cross-country. Following completion of each circuit (or loop) the horse has to be stood for 40 minutes and then given a check by a vet before being allowed

to continue. This means there may be a significant time lag between passes when returning past a checkpoint. It also means that radio traffic will often include "vetted out" numbers.

This year the location was based at the Peaks Hall, approx. 15 km NW of Hawarden in North Canterbury, and close to the Waitohi River.

For those of us who were there for the full time, it meant arriving on the Thursday afternoon and preparing for an early start for Friday. Setting the alarm for midnight was mostly a waste of time, hard caravan beds taking some getting used to.

All radio comms were via the 6975 Mt. Noble repeater. The Christchurch Daihatsu Comms vehicle was used as Ops Base and it arrived on site shortly after midnight.

Day 1. (0100 start for the 160 km event, 0600 for the 80 km event). Rob ZL3RO and myself were at C/P 1, our location for each of the three days. This was 11 km by road (but much further for the riders) and approx one hour from the start, and covered both Loops 1 and 2. For L 1 the riders passed us in one direction then returned past us from a different direction some 20 min later, before heading for C/P 2, located about an hour away. Initially there were to be two individual checkpoint 2's (labelled 2a and 2b) and were located about 400 m apart specifically to cover two different loops. However, the previous night the organisers "tweaked" the courses and eliminated C/P 2a, the other becoming simply C/P 2. Consequently, some time and long after the riders had passed us, Don ZL3DMC enquired of Base as to when he should expect to see some riders, only to be told that they had mostly finished. This came as a surprise because we had not been advised. Don repositioned for the remainder of that shift. The rest of the day progressed well with no major problems. An amusing incident (though probably not for the horse and rider in question) happened in the early hours. A local farmer, whose land the circuit crossed, had been advised that the start was one o'clock, but not realising this meant AM, decided he wouldn't need to shift his electric fence until later in the morning. The first horse and rider found it alright, and we can assume it was "alive and kicking". Our duties were completed by 0800 and we later relieved the Base crew to give them a rest.

Day 2. (0600 start / 100 km, 0700 start / CTR). A much more civilised start time, and for Rob and me a relatively short duty, being clear shortly after 0930. That said, the day was certainly not finished. We had not, unfortunately, picked up a mistake in the information we had received, detailing the duty times for the Checkpoints. Nominally, C/P 2 should have been an hour from C/P 1, but for this day it had been listed as five hours. Expecting to have a bit of a lie in, one operator, having to answer a call of nature, suddenly found horses going past. A frantic call on the radio confirmed the mistake and also showed a similar listing for the following day as well. The organisers confirmed that it was their mistake, not ours.

As we were returning to Base, we found a comms problem with C/P 3, claiming they had a flat battery. I took my spare to them but it was also found they were not in the correct location and were in a shadow area from the repeater. A quick reposition solved the problem. Returning to Base, I met Richard ZL4FZ / ZK9EA who had not before been involved in this type of event and had come up for a short time to get an overview, and I was able to introduce him to the organisers and show him the two checkpoints closest to Base before he had to leave.

Day 3. (0300 start / 120 km, 0700 start / 64 km). Again an early start but with an estimated 2 hour gap after the first group, Rob and I opted to return to Base for a leisurely breakfast then back to our checkpoint for the next round. We almost misjudged it, with the lead riders in sight as we arrived. There were no issues that day and everyone was all packed up and away by 1630 hr. The organisers were greatly appreciative of our efforts and as Richard comments, this type of event has many similarities to SAR work and is a very good type of training for that.

*Geoff ZL3QR*
*Dep. S/L, North Canterbury*

**Activity Briefs**

*(A selection from July /August.)*

*4/7/2012* Marton Branch 23. SAR. Whangahue Beach. Despondent person lead Police to believe they were at beach area and intending to 1X in this area. Urgent search required to locate MP. Police Dog team located. Fatal.

*8/7/2012.* Northland Branch 28. SAR. Dargaville Hospital. 92 year old male missing from hospital. Lost party located by LandSAR team and returned to hospital.

*12/7/2012.* Thames Branch 41. SAR. Summit, Kopu/Hikuwai Road. Search for misplaced tramper. Found and escorted to safety.

*14/7/2012.* Manawatu Branch 20. SAR. Makino Rd, Feilding. Missing elderly hunter. Walked out, said he was not lost.

*21/7/2012.* Otago Branch 30. Rural Fire. MacRaes Flat Rural area, 135 km from Dunedin City. Large Rural Fire. Controlled burn-off got away. Some damage to established commercial forestry, some private plantations destroyed, Some stock losses. 1500Ha burnt. Six helicopters deployed with buckets. 0500 hr start, to have the Dunedin Mobile Communications Unit on site by 0730 to be used as the ICP.

*1/8/2012.* Manawatu Branch 20. SAR. Palmerston North city. Lost person 73 year old dementia. We searched N-W quadrant of city with no success. Search called off at 0230.

*4/8/2012.* Otago Branch 30. Sports & Training. South Otago. Assist Br 08 with the Catlins Coast Car Rally. 4 operators assisted on the day. Terry ZL4TAE installed the Br 30 STSP Repeater on Hinahina Hill the day prior to the Rally.

*4/8/2012.* East Southland Branch 08 Sports & Training. Catlins Coast. The Annual Catlins Car Rally. A total of 21 Amateur radio operators provided times and tracking information for the Catlins Car Rally. We also set up two STSP repeaters, tuned and installed 12 Commercial RT's for the rally management team. The result was an excellent day out enjoyed by all.

*14/8/2012.* Otago Branch 30. SAR. Frasers Gully. Search for a mentally ill woman who went into the Fraser Gully Bush Reserve on a wet and cold day. Teams were deployed into the area using the ESB 57 SAR repeater channel. The woman was located some 2.5 hours into the search when she responded to the calls of searchers.

*20/8/2012.* North Otago Branch 64. SAR. Ohau Lodge. Missing male and female on skiing trip got disorientated in fog and walked wrong way. Missing party found next morning by helicopter. All OK.

*22/8/2012.* Western Suburbs Branch 03. CD Support. Elcoat Ave, Te Atatu. Auckland weekly radio network testing. Two VHF networks and one HF network. Three man/hr per week. Has been carried out for 11 years. Two operators involved. Status of radios installed at libraries, hospital and community centres verified. HF network checks North Island regional council offices.

*22/8/2012.* Marlborough Branch 22. SAR. Picton. Missing female tourist day walker. Female walked out following day as teams walking into valley.

**Conclusion**

Thanks to those who have contributed to this issue. Material for the next one to please be in our hands by 3 November 2012. Photos, if included. preferably on a separate CD (with captions) mailed directly to us. E-mail pix may be acceptable but will be at the Editor's discretion and must not be embedded in the text.

Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz> or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137.

(N/B. Articles to be in doc, rtf or txt format please. Publisher or pdf we can not use. Thanks.)

**Reminder.**

The next Section Leaders Nets should be 15 October and 19 November, 3900 kHz USB at 2030 hr NZDT unless notified otherwise.

Until next issue,

73, *Geoff ZL3QR & Bev ZL3OV*

Next deadline for copy is
**10 November 2012**

# Old Timers' Club

Stephen Hayman ZL1TPH
<zl1tph@nzart.org.nz>

Hi, Everyone. The Sangster Shield, also known as the Radio Shield, became of interest a few months back when a number of amateurs started discussing the whereabouts of the original trophy and what it looked like, as it had been purported missing many years ago.

Naturally the book *Hamshacks, Brass Pounders & Rag Chewers* was the first reference book and it was found that the Sangster Shield dates back to 1927 when Ralph Sangster presented it to the amateurs of New Zealand for an annual competition.

A second search delved into many past issues of *Break-In* to find any pictures of what the shield originally looked like and, thanks to Ken ZL4HU, pictures were found in the January 1937 and the June 1939 issues of *Break-In*. Those pictures depicted a wooden Shield, with a large metallic, same-shaped, shield on the inner, which apparently has "Radio Shield" inscribed at the top; this is then surrounded by ten smaller shaped shields that are assumed to have been awarded to the first ten winners from 1927.

As listed in the1937 *Break-In* "The following are the names of those who have held the shield"

1927 – ZL2AH, R.V. Roberts (then ZL1AE)
1928 – ZL2AK, D. Cooper (then ZL1FU)
1929 – ZL1AC, (the late C.L Button)
1930 – ZL3CI, R. Kay
1931 – ZL4CA, A.R. Harris
1932 – ZL4CA, A.R. Harris
1933 – ZL2HR, A. Stevens
1934 – ZL4GH, D.K. Woodbury
1935 – ZL2BH, W. Hall
1936 – ZL3FF, C.H, Turner

Can anyone help with the whereabouts of the Sangster Shield; and although the contest is run every year, we no longer know what has happened to the original Shield. If any of you could help with information of where the Shield may have got to, that would be most appreciated.

Also, any account or story ahead of your past activities in the Sangster Shield contest from the early days, with old valve radio apparatus, or otherwise, to share with your fellow OTC members would be most appreciated. The Sangster Shield contest is still current today, on the third weekend of May each year as mentioned on the NZART website.

### Old Timers' Club-OTC (ZL)

- To recognise service to Amateur Radio;
- To revive and maintain interests and good fellowship among the older members in the common cause;
- To offer advice and encouragement to newer Amateurs;
- The Club is affiliated to the New Zealand Association of Radio Transmitters (Inc.)

***Grand Old Man***
Ivan Horn ZL2ATU
P.O. Box 7250 Wanganui
E-Mail <loobie@kol.co.nz>

***Secretary/ Treasurer***
Barry Stewart ZL2RR
1 Caversham Road,
Westmere, Wanganui 4501
E-Mail <ZL2RR@xtra.co.nz>
Phone: 06 - 345 4152

***Monday Evening SSB Net***
Net details: 2030 hr (local time) each Monday on 3.870 MHz LSB.

***Sunday morning AM Net***
Net details: Sunday morning at 10.30 am on 3.850 MHz.

***SSB Net Controllers***
Roy Symon ZL2KH
Don Dalrymple ZL3SZ
Stuart Watchman ZL2TW
Pete Moore ZL2AUB
Ivan Horn ZL2ATU

***AM Net Controller:***
Doug Alexander ZL2AWF
District Representatives
ZL1: Stephen Miller ZL1FS
ZL2: Stuart Watchman ZL2TW
ZL3: Don Dalrymple ZL3SZ
ZL4: Peter Anderson ZL1LR

### Silent Keys

There is one member to farewell.

- 761, ***Mr Fin (Finlay) Bruce*** ZL4HI, licenced in 1960

Our sympathy goes to their family and friends.

### Sangster Shield memories

Warren ZL1AIX, Ken ZL1AIH and I were at secondary school together, I think Ken and Warren were licensed 1952, and mine 1953, we could not get ham license until aged 16 in those days. We all had a go at Sangster Shield QRP 80 m CW contest in those days, sporadically afterwards.

In those days you had to spend at least a year on 80 m before being allowed to apply for a 'High Frequency Permit' to work the higher bands. This needed a Morse speed of 15 wpm and possession of a 'frequency meter'. Usually the latter was a BC221, borrowed to meet the law and then returned to its rightful owner.

My Morse test was conducted at night in the Auckland CPO by that most excellent gentleman, Dan McMahon, the Chief Radio Inspector. He gave me a 'practice run' receiving, and then asked me to send on the P&T standard Elliot brass key. I carefully sent as close to the required 12 wpm as I could. Mr. McMahon asked if I could speed up a little, which I did. He then announced that I had passed at both 12 and 15 wpm! My first call ZL1DR.

When first on the air I had a Marconi R1155 ex-air force general coverage receiver. Contrary to popular opinion there was not a flood of good communications receivers released after the end of WWII. It was the Cold War era and one presumes they were being held in storage as the dreadful shortage of communications receivers for the British services at the start of WW II was not forgotten.

At that time the take home pay for an ordinary worker was about £10-12 per week, £20 put you in the ranks of the comfortably off. Many hams used ZC1s which cost £20 from the War Assets Board. There were some ARC-5 receivers that cost about £6. So, not exactly cheap, although parts for QRO rigs could be scored from 'Sinewave' George's warehouse down in the Hutt, sometimes at very low price. Like big transformers for less than the value of the copper.

A clean R1155 went for around £20, without power supply. My income was 5 shillings a week for mowing the lawns, no mow, and no pay, and a bit more from mowing neighbours' lawns. I saved money frantically, acquired a clean but dead R1155 for £14 from a newly arrived Brit immigrant who needed money. Managed to find the fault, cannot remember how, but it was one broken wire and I made up a power supply from parts salvaged from a defunct AM broadcast receiver.

So, in business on receive, and could start learning Morse off the air from the RNZAF station ZKF sending MCW around 3.3 MHz every night. Had headphones handed down by my father; Brandes 'Matched Tone' with a BBC license number, believe vintage 1926.

ZKF sent regular spaced Morse. Not Farnsworth where the characters are sent at, say, 15 wpm, and the spaces widened to make 5 wpm. The problem with regular spaced Morse is that most learners hit a wall at around 10 wpm as they had learned to read the characters as strings of separate dots and dashes rather than as unitary wholes. To reach the 12 wpm to get the ham ticket required unlearning and then acquiring a new skill. This was very frustrating and engendered a hatred of Morse in many people which had bad political side effects for amateur radio in ZL in following years. So there I was with a new ham ticket and a receiver. My father disapproved, feared that ham radio might distract me from my studies.

In the matter of antennas. In spite of having a certificate in electrical engineering my father had a fear of electricity in any form. The mains switch on the house distribution board would be turned off when the family left the house to go to the movies. At that time there was a regulation that domestic radio wire aerials (every house had one) had to be fitted with a 'lightning arrester' where the wire entered the house. Ours consisted of lump of green ceramic with two terminals, one for the antenna, the other to an earth rod. On the back of the device was a pit filled with beeswax. Never did find what was in there, but was aware that whatever it was likely very lossy if RF was applied.

I demonstrated to my father that our 6 valve domestic radio would continue to deliver 'Uncle Tom and the Sankey Singers' at full strength using only a length of wire under the house for an antenna. I was grudgingly given permission to use the home aerial, about 60 ft of wire running up from near ground level

into a tree in the backyard. The lightning arrestor was sacred, could not be interfered with. Without it we would certainly be hit by lightning and incinerated or worse. After considerable study I ran a fan of wires as a counterpoise under the house floor and twin feeders for about 15 ft under the floor and up into the front veranda which was my bedroom, study, and now radio shack.

A kindly older ham loaned me an 80 m ARC-5 Tx with 2 x 1625 (12 V filament 807s) in the output. A lovely stable unit, a clean note keying the cathodes of the 1625s. With about 300 V HT it gave about 25-30 W in and I managed to work around the Pacific basin with it. Key was an Elliott from the P&T. The P&T still used hand sent Morse from the CPO to the suburban post offices but Morse was being phased out. A kind colleague of my father's liberated a P&T key and made an official loan document for me. This alleviated my father's worry that there might be a police raid to recover the key. (I am not making this up!).

I think my first Sangster Shield QRP contest was in 1953 although I might not have submitted a log. Got the ARC-5 down to 5 W in by removing one 1625 and reducing the screen volts.

The R1155 was an only slightly glorified BCL set, but was sensitive and stable enough. Selectivity was lacking, but I acquired a war surplus 'Range Filter' in a natty little box. This was an audio filter in the line to the headphones. Without really knowing what I was doing I configured it as a peaked low pass audio filter and it served me very well.

I think you could work a station only once in the contest, so there were long periods spent tuning the bottom end of 80. Think the hours were 2000-2400 local, Saturday and Sunday night of the contest weekend. Although the contest was very leisurely by any standard, there was a sense of genuine competition as we all had a good idea of the capabilities of one another's stations and knew who to try and beat.

Later in the evening things could get interesting and DX worked. VK of course, but the odd JA and even South American could be heard plus South Pacific Islands. Cannot remember if I managed to work JA with 5 W, but remember hanging in for what seemed like forever while a JA struggled to pick out my call. Local noise was usually very low in those days so you could hear the proverbial two wires rubbed together in Tibet.

Later on I managed to win the Shield, albeit with a better but still modest antenna. Around 1990, taking a leaf from ZL2JJ's book, I entered with a 3 tube 1930s replica regen Rx and a single 47 tube xtal oscillator Tx. Managed to come second.

Long ago I came to the conclusion that in this life you ultimately compete against yourself. Looking for a challenge? Give the Sangster Shield a go. Most modern rigs can be wound down to 5 W no trouble. Or borrow a ZC1.

73 *Barry ZL1DD XU7AEL*

### Amateur of the year 2011

To follow on from the last column of OTC, a picture is presented with Barry ZL2RR in receipt of this award for his meritorious service over many years to the NZART national QSL bureau and in recognition of outstanding Service to Amateur Radio.

Barry Stewart, ZL2RR was awarded Amateur of the Year 2011, and was presented with this award in the year 2012.


### Acknowledgements

Many thanks go to the contributors who help make this column happen with their input: ZL1DD, ZL1TGC, ZL2ATU, ZL2RR, ZL2AXN and many others.

*Barry Stewart ZL2RR Amateur of the Year 2011.*

## From the *Break-In* Archives


**Compiled by Jim Pye ZL2PU**
**<jim.pye@jemfamilyresearch.co.nz>**


**Introduction:**

The *Break-In* Archives are a service provided to NZART by J.E.M. Family Research Ltd. The service aims to digitise the early issues of *Break-In* to help preserve, and make available to all, the history of Amateur Radio in New Zealand.

The archive is located at <http://greenstone.jemfamilyresearch.co.nz/break-in>. It is hosted using the digital library software; Greenstone, from the University of Waikato.

Please send any feedback to <jim.pye@jemfamilyresearch.co.nz>

As the issues of *Break-In* are scanned snippets of different Amateur Radio activities are being discovered and noted. It is hoped that this small section will stimulate your interest to explore the early days of radio and Ham activity in New Zealand.

**From the *Break-In* Archives**

Were you aware that in December 1932 a call went out for New Zealand Amateur Radio Operators to help with the communications tracking a planned flight in February 1933 of the plane Southern Cross, piloted by Sir Charles Kingsford Smith, across the Tasman Sea?

Q1 Any ideas what the call-sign the operators were told to listen out for?
Answer on page: 40
Search out your own answer at the NZART *Break-In* Archives at: <http://greenstone.jemfamilyresearch.co.nz/break-in>

The June 1932 issue of *Break-In* reported that a Mr L F Copp obtained 100% for both the theory and code exams. This prompted the Radio Inspector to write to the RSC (Radio Society of Christchurch) where he studied.

Q2 What was the call-sign assigned to Les?
Answer on page: 40
See if you can find the answer at the NZART *Break-In* Archives at: <http://greenstone.jemfamilyresearch.co.nz/break-in>


### Summary

The OTC column in *Break-In* is a forum for members to publish a letter, or an article. OTC readers, along with association members, that all will enjoy reading and hearing about other radio amateurs experiences, both past and current.

Contributions can be technical, an account of first involvement with early amateur radio, nostalgia, along with vintage radio which all provides an invaluable source of information on the history of their hobby.

The "Old Timers' Club" was essentially a social organisation, and that is still current today.

Articles relating to all aspects of OTC, are most welcome, and to be addressed to: Stephen Hayman, ZL1TPH; Postal address, 68 Kath Hopper Drive, Orewa, 0931 or via email to <zl1tph@nzart.org.nz> We also accept large picture files sent via email and will transcribe hand written letters to text.

73 Stephen ZL1TPH


**REMEMBER:**
*Leave a three second pause between overs when using repeaters. Someone else may have an urgent message.*

# WARO – nz womens amateur radio operators

with Topsy ZL2LS, Sharon ZL2BQ and Ngaire ZL2UJT
<waro@nzart.org.nz>

Hello to all the members and those reading the WARO page. I hope that you have all been keeping well as there have been some very nasty flu's and colds out there that seem to be hitting a lot of people very hard. This winter has seen a lot of very cold and wet conditions all over the country, so rug up, keep warm and just think that summer is on the way and it is only 4 months until Christmas. Where has this year gone?

### Request from Bulletin Editors

A follow up from the discussion we have had over the last two months. We need WARO members to please submit articles for the *Break-In*. If you don't submit anything you will not get anything printed so please girls, even if you head off to a swap meet, a junk sale or whatever take some pictures and write a small article and send it to us please. Many thanks.

### Member's News

Topsy ZL2LS and Sharon ZL2BQ have finally gotten over conference and are settling back into somewhat normal life again.

Ngaire's ZL2UJT OM Graeme ZL2APV has recently had his heart surgery and we hope that you will be back up and running around before long Graeme, but remember to do what the doctor says.

### Car Rally

Cathy Purdie ZL2ADK was recently involved with running the communications at base for the Day Breaker car rally around the Manawatu in July last month. They were based in Manfield in Feilding. They had a lot of fun and had a great crew to work with. What made their day was being thanked by one of the organisers at the end of the day and great comments like "it was so much easier having good operators who know what they are doing". Well done Cathy and your team in base.

Also helping Cathy for the day in base was Cheryl ZL2VCC and Paul ZL2BE

### Silent Key

- ***Henry, Elva June*** (ZL1BIZ now SK).

Much loved wife of Ian. Tragically taken from us on Wednesday 8 August 2012, as the result of an accident. Elva joined WARO in 1968 and was an active member for many years. She was a keen DXer and spent many hours enjoying her special hobby. She will be sadly missed by family and of course WARO members.

### Conference knitted gloves go south into production

Your idea of finger-less gloves for the NZART conference has been taken a step further.

I work at Castlewood Nursing home here in Alexandra and the residents needed a winter project that could be performed indoors. Your gloves gave me the idea of getting the residents to knit gloves as I had a lot of wool left to me by my late mother. The Divisional Therapist Pat O'Connor and I counted the stitches of my gloves and got the residents started in mass producing gloves. Six residents who were capable of knitting have knitted 3 pairs each and are still going strong. Pat O'Connor says it has been a worthwhile project for the residents.

Many thanks Topsy for the idea of the gloves.

*Trish Lochhead*

The knitted hand warmers have become a great hit with our members throughout New Zealand. A suggestion was made by one of our members, Jolene ZL1UJB, that we could embroider our call-signs on top.

### Branch 27 YL History

Branch 27 at New Plymouth is your typical Radio Club throughout the country but like all clubs we have had our ups and downs. At the moment it is lively and we are enjoying a resurgence of interest in radio with a couple of new young amateurs ready to sit their license. Unfortunately this has not happened with our YL members and presently we only have 3 YLs coming along to the meetings, one being not licensed. But in the past New Plymouth boasted a fantastic bunch of YLs who participated in all activities within the branch.

Thought I would run some of the names past you all and I'm sure you will recognise these folk. One of the many lady supporters over the years was Carol Gaudin ZL2VQ who has been involved with Branch 27 since 1978. She has told me of the time when she sat at home with her 3 boys in bed whilst her OM Wayne ZL2VN was out at a Branch 27 "Fox Hunt", listening to the comms on VHF, while a YL called Dale was the "rabbit". Dale was eventually caught on the top of Paritutu rock very late that night. Carol has been involved in all aspects of radio; Branch 27 Vice-President, AREC, CD, and SAR, plus serving on NZART council for 6 years. Jill O'Donnell ZL2DBO has also been with the club for many years as Secretary, Newsletter compiler, committee, and is still active attending meetings as AREC leader. In this capacity Jill has been our local co-ordinator for the Tarmac Car Rally comms. She is always available to help with Field Days and working bees etc. Her daughter Le-ann ZL2TLO has also been involved in AREC and supported all our activities over the years. I always think of Le-ann doing the Tarmac Rally in the sweeper car loving every minute of the excitement of speed, coming through with a big smile on her face, and shouting Yahoo over the radio. Ann Francis ZL2UTR held position as Secretary for some time ,and was also keen to help out at Club activities. Carolyn Sarten ZL2JP has been very active in the club over the years. Carolyn ZL2JP has been a keen DXer over the past years, and has a folder filled with certificates to prove it. Jean Gilchrist ZL4JG WARO Life Member and active member who now lives in Dunedin has held so many positions over the years, scribe of WARO NZART, Myrtle Earland Memorial Trophy etc. Jackie Sinclair ZL2UJS is always available for Car Rallies and has been involved with search and rescue over the years. Vivienne Jones ZL2VJ and her sister Marcia Lawn ZL2MX have also been involved with the club and attended meetings and Field Days over the years. Vivienne being Secretary and Newsletter Editor for some time. Vivienne ZL2VJ and Jill ZL2DBO were on Conference Committee when we held our NZART Conference. Anne Griffiths ZL2BOV was Treasurer for some years and also had the treasurer job to do when

*Conference Gloves.*

*From left Cheryl ZL2VCC, Cathy ZL2ADK and Paul ZL2BE.*

*Silent Key Elva Henry ZL1BIZ.*

# Jamboree on the Air; Labour Weekend 2012

*by Jim Parnell ZL2APE*

*The Jamboree on the Air (JOTA) as well as the Jamboree on the Internet (JOTI) will be on us soon. Over that weekend, scouts and guides in every scouting country of the world will be communicating with each other via amateur radio in all its modes as well as by means of the internet.*

JOTA and JOTI fall on Labour Weekend this year, as it does now and again due to the way the dates fall in the month of October. Although JOTA and JOTI are nominally for the 48 hours of the Saturday and Sunday, there is no reason why activity should not continue on the Monday after our weekend so as to be able to work those on the other side of the International Date Line.

This will be my last year as National Organiser JOTA for New Zealand. I have enjoyed occupying that position for the past 40 years, but it is time now to move on and let someone else take over; someone who can bring fresh ideas to the task. I well remember the time many years ago when the Chief Executive Commissioner of the scout movement and our International Commissioner invited me to accept the position because I had run a couple of JOTA camps. I said yes. No ceremony, no paperwork, I just became *it*! And I have been *it* ever since.

It had been a little awkward running those first JOTA camps as we had to bend the regulations a bit due to third party traffic not being allowed. After some discussions, the Post Office (which was the regulatory authority) agreed to allow scouts to talk, but ruled that I first had to ask it for permission. Later, I pointed out to the Post Office that guides were like scouts but of a different gender, and that in other countries, scouts had both male and female members. As a result, our guides were allowed to participate on an equal basis with scouts.

The initial hostility with which some amateurs in the past regarded scouts using their bands didn't last long and many amateurs and Branches now look forward to the event. It gives the hobby of amateur radio good exposure.

I like to think that allowing scouts to speak on the air was a contributing factor in eventually allowing third party traffic generally on amateur radio frequencies.

Being National Organiser led to me being invited to the World Scout Jamboree in Norway, in 1975. The Norwegian scouts had developed Radio Scouting activities and they wanted to tell the world about it. Fortunately, I was able to accept and had a wonderful time there. The 80 metre fox hunting equipment we still use in scouting was part of the Norwegian offerings at the Jamboree. Later, I went to other World Jamborees and assisted with the radio activities at them. Not being a talker, I usually gravitated to the kitset building at these jamborees, and let others do the operating. It was interesting teaching scouts who had never touched a soldering iron before. We had a very high success rate with kitset building.

The World Jamboree in Chile was particularly interesting because there was a Jamboree in New Zealand at the same time, and the window for communication started at about 4 am Chile time and 6 pm New Zealand time. I would go to bed as normal with a string tied to my thumb. At 4 am, someone on the night shift would come and pull the string to wake me and I would crawl out of the sleeping bag, put some warm clothing on (the nights were chilly) and slide into the operator's chair. They were good contacts too. On one occasion, I had the NZ contingent to the Jamboree at the station to talk to the scouts back home. It wasn't as successful as it might have been due to the generation gap between the older scouts in Chile and the younger scouts in NZ.

Marie Smolnicki ZL2THE, who regularly runs the JOTA station at the Branch 18 clubrooms has accepted the position of National Organiser and will take over after this year's event. I am sure that under her guidance, JOTA will continue to flourish

I wish to give my heartfelt thanks to all amateurs, our Association, and NZART Branches for assisting NZ Scouts and Guides to take part in JOTA over the many years for which I have been National Organiser. βi

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our NZART Conference was held at New Plymouth. We also have Ingred Hanlon ZL2ICE who has been active over the years, and Myrle Camkin ZL2MIC, also a keen DXer and always happy to help on Field Days. I am currently treasurer. Our Field Days in the past probably had almost an even number of females to males and it was a really social time, many girls with young families. As you can see we have had an active bunch of girls, unfortunately age is all catching up with us and we need to find some young girls to carry on the interest. We meet for coffee a couple of times a year with others who have licenses but need more people. My challenge to you all is how do we do this? If anyone can come up with suggestions of how to get your girls interested I'm sure we would love to know. Ngaire Jury ZL2UJT

Please remember to support your *Bulletin*, WARO page in *Break-In* and our competitions and awards Our Best Wishes to you all

*Topsy ZL2LS*
*and Ngaire ZL2UJT*

WARO contacts should you need to contact the Executive committee

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***Secretary:*** Lynnnette McDonald ZL1LL. Email: <lynnette.mcdonald@xtra.co.nz> Ph: 09 238 8580 or 09 536 6239

***Treasurer:*** Heather Scott ZL2TYF. Email: <secretary@nelsoncarclub.co.nz> Ph: 03 5446502


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## MEMO to *Break-In* contributors

### CDs:

Nowadays many contributors are sending me graphics and photos, etc on CD and this is much appreciated. At present the cost of a CD is less than the postage costs so, unless requested otherwise, they will not be returned. Please let me know asap if I still have a CD or photo that you would like returned and I will action. Thanks, *John ZL3IB Editor*

# SPAM – Society For The Preservation Of Amplitude Modulation

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07 855-5435

### Copy for *Break-In*

At the moment the cupboard is bare in terms of copy for the "SPAM" column. I need your support fellows, How about putting "Pen to paper" as it were, and tell of your experiences in the days of yore, in the days of AM. I am reminded of the days of the late "Crusty" Brain (ZL4CZ, then) and the late Casey Harris (ZL4CA, then), both of whom were avid story tellers. I think of George Hedge (ZL4FD, he must be 94 odd now and still going strong). There must have been other "characters" of the dark art of amateur radio over the years. How about telling the world about them.

Anyway, on to interesting things; herewith this month an article from John ZL3IB. in which he describes one of his collection of vintage communications radio recevers.

### From my collection
### The Hagenuk UE12 Marine Receiver

*by John R L Walker ZL3IB*

The Hagenuk type UE 12 is a high-class, general-purpose communication receiver specially designed to meet the tough requirements of shipboard service. With its nine frequency ranges the receiver covers from 95 kHz to 28 MHz allowing the reception of CW, MCW and radiotelephony. Special provision is made for direct reception of the 500 kHz distress frequency on one position of the bandwidth-switch and independent of the frequency set on the dial.

When operated in conjunction with a DF adaptor the set can also be used as a Direction Finder whilst reception of VLF is possible by use of an additional converter.

A built-in calibration oscillator permits calibration at every 100 kHz point of the dial over the whole frequency range whilst an auxiliary dial enables pre-tuning of all frequencies in the HF and RT ranges with high accuracy. In addition crystal-controlled operation of the first mixer can be selected for five spot frequencies where a high grade of frequency stability is required.

#### Circuit features

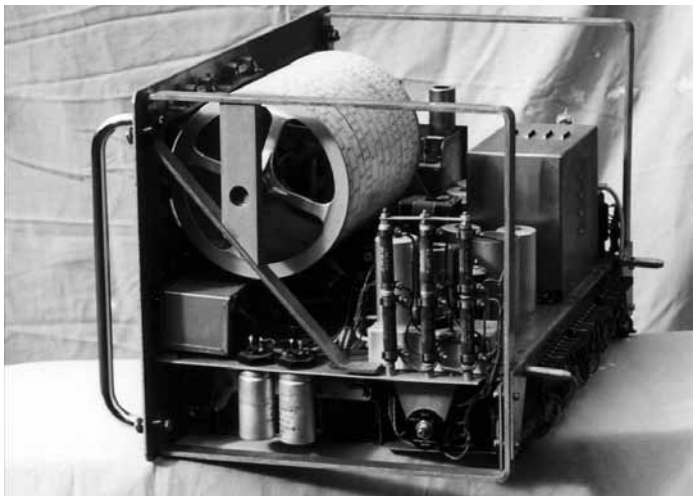
The set is designed for operation as a single conversion superheterodyne on the LF and MF bands over the range 95 to 1700 kHz. Double conversion is provided for the reception of the HF bands 1.6 to 28 MHz.

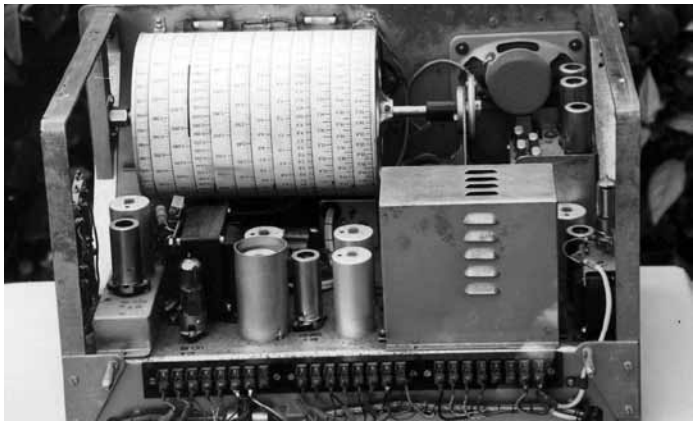
On the 95-177 kHz range the incoming signal is fed via an RF amp, V1, (UF85) to a mixer, V2, (UCH81) and thence to two IF stages (V4, V5) at 80kHz; these include WIDE (3 kHz) and NARROW (1 kHz) band-pass filters. The signal is then demodulated and fed to the AF amplifier and output (UCL82) stages. The BFO operates at 78 - 82 kHz.

On the 1.6-28 MHz range the set operates as a double-conversion superhet. Now the incoming signal from the anode of the first mixer is taken out at 1522 kHz and fed to a crystal-controlled second mixer V3 (UCH81) and thence, via a quadruple band-pass filter, into V5 of the 80 kHz IF chain.

When switched to the 500 kHz International distress frequency V1 and V4 serve as a fixed frequency "straight" or TRF receiver.

Lastly, the set includes an elaborate 100 kHz crystal-controlled calibration oscillator covering all bands. This can also be used to pre-tune the ship's transmitters.





Like many marine radios the set is designed to operate from 110 - 250V, AC or DC. Thus the valve filaments are arranged in series and it uses selenium rectifiers in the HT supply.

#### Mechanical design

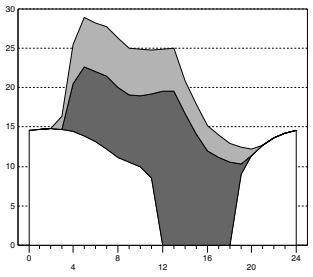
The set features a large full-vision dial drum about 80mm in diameter and 150mm long giving scales of over 240mm long for each band. This is driven via a concentric 10:1 and 60:1 reduction drive. Frequency bands are selected by a 10 key piano-type switch, plus several relays; all of which would be a nightmare to service!

The receiver chassis is designed as a slide-in unit with multiple blade electrical connections at the rear. Both chassis and cabinet are robust to meet arduous shipboard conditions and are finished in grey Hammerglaze®.

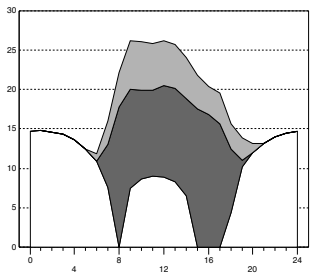
| Technical Data | |
|---|---|
| Frequency coverage | 95 kHz to 28 MHz in 9 bands |
| Tuning accuracy | approx. ±300 Hz for 95 – 1500 kHz range |
| Types of operation | AI (CW), A2 (MCW), A3 (radiotelephony) |
| Sensitivity at SIN of 3 | AI 0.1 – 1.0 µV,A2/A3 1-6 µV. |
| Bandwidth (at -3 dB attenuation) | on WIDE approx ± 2.5 kHz<br>on NARROW approx ±0.5 kHz<br>on NOTE FILTER ±) 0.1 kHz<br>on the distress frequency± 6 kHz |
| Selectivity | approx + 0.1 kHz approx 50 Hz/dB beginning with band limits |
| IF | on 95 – 1700 kHz 80 kHz<br>on 1.6 – 28 MHz 1522 and 80 kHz |
| IF rejection | > 80 dB |
| Frequency range of BFO | ±2.5 kHz |
| AF output to internal speaker | 1-2 W |
| Valves | UF85 (3), UCH81 (2), UBF80 (2), UCC85 (2), UBL80 (1) |
| Dimensions | 400mm (h), 600mm (w), 410mm (d). wt 40kg. |

# Ionospheric Predictions

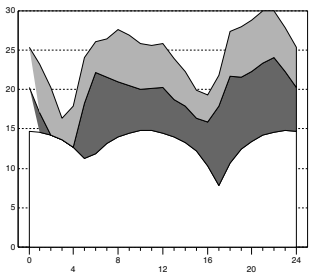
**NOVEMBER / DECEMBER 2012 T-index = 84**



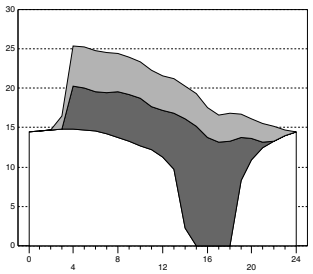
WN-
Moscow
(SP)
16548 km
312°



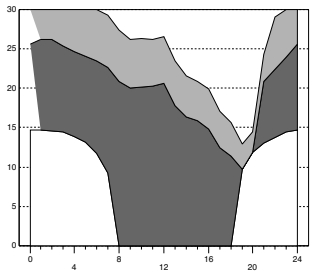
WN-
London
(SP)
18814 km
343°



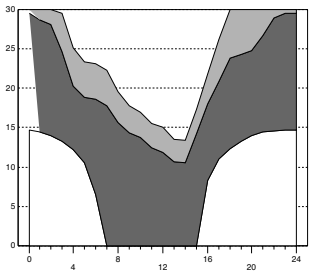
WN-
Jo'burg
(LP)
28265 km
31°



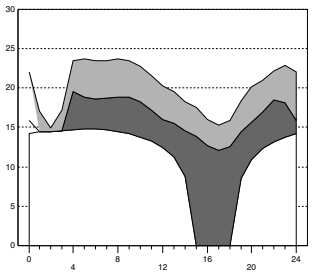
WN-
Istanbul
(SP)
17168 km
281°



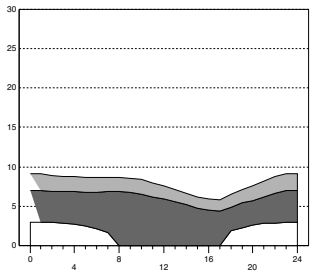
WN-
Tokyo
9274 km
332°



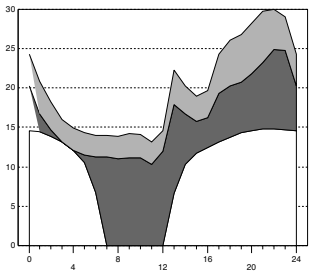
WN-
San
Francisco
10859 km
45°



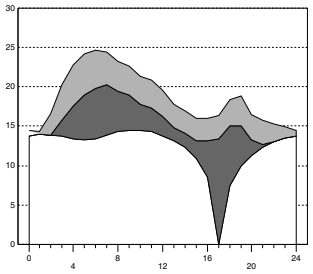
WN-
Cairo
16519 km
261°



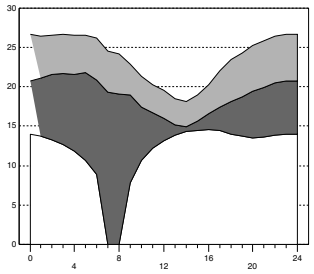
WN-
New
Zealand
300 km



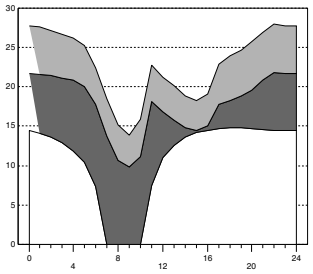
WN-
New
York
14402 km
66°



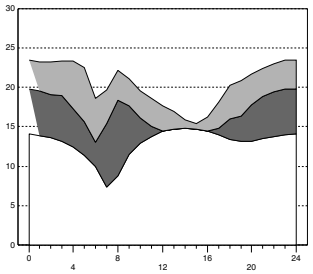
WN-
Jo'burg
(SP)
11759 km
211°



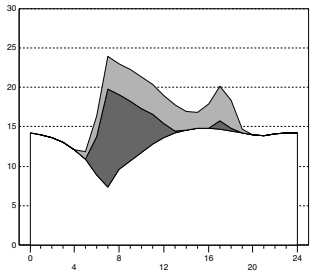
WN-
Rio de
Janeiro
11780 km
144°



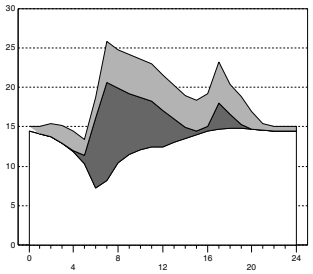
WN-
Barbados
13962 km
104°



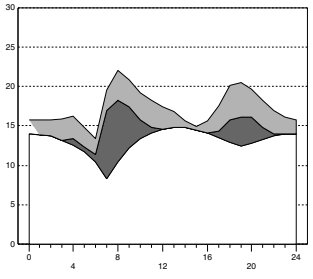
WN-
Dakar
16862 km
155°



WN-
Moscow
(LP)
23476 km
132°



WN-
Istanbul
(LP)
22856 km
101°



WN-
London
(LP)
21210 km
163°

Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

# HAMADS

**WANTED:** RADIO VALVES. Cash paid for old radio and TV valves. Prefer new in boxes. Telephone (09) 528-2022 or E-mail <paul.ssegrub01@gmail.com>

**WANTED:** IC-24AT Handheld, battery pack immaterial. Kevin ZL3DAC. Telephone (03) 789-9875.

**WANTED:** Kenwood MC85 Microphone. Kenwood AT250 Antenna Tuner complete with cables. ZL1ALT. Telephone (07) 856-1064 or (027) 815-9129.

**WANTED:** Kenwood TS830S working or not. ZL1KEN. Telephone (09) 425-9301 or E-mail <ww.robbies@xtra.co.nz>

**WANTED:** Valves wanted to purchase, fair price paid, all types but esp following types – ECC32 ECC33 ECC34 ECC35 B65 6SN7 6SL7 ECC81 ECC82 ECC83 ECC803S ECC88 E88CC E188CC 7308 EF86 KT61 KT66 KT88 EL34 EL37 PX4 PX25 GZ32 GZ33 GZ34 GZ37 CV378 CV575 VT52 45 50 211 801 805 845. Also looking for an AVO or Weston Valve Tester and a good quality capacitor tester. Geoff Edwards, Valve Radio Spares, 12 Oxford St., Lyttelton 8082. Telephone (03) 328-9208 or (027) 433-8452 or Fax (03) 328-9207 or E-mail <tubehead@xtra.co.nz>

**WANTED:** User and Service Manuals for National Panasonic Radio Receiver Model No RF-2800B. Details to: Robert (ZL2KD) E-mail <Robert.Keegan@xtra.co.nz>

**FOR SALE:** JRC NRD 525 Receiver with JRC NRD NVA88 matching speaker. 2 X Yaesu FRT 7700 Antenna Tuners for Yaesu 7700 and 8800 Receivers. Offers to ZL1ALT. Telephone (07) 856-1064 or (027) 815-9129.

**FOR SALE:** Drake TR-7 S/N 9505, PS-7 Power Supply, RV-7 Remote VFO, 7073 DM Hand Microphone – $600. Good working condition. ZL2AAQ. Telephone (06) 345-9033 or E-mail <jeffers.rj@xtra.co.nz> or Call-Book Address.

**FOR SALE:** Kenwood TS-120S Pre-WARC model with Kenwood PS-30 Power Supply, Kenwood MC-355 Noise cancelling microphone, and manual. Good condition. What offers? Jim Parnell, ZL2APE. E-mail <jim-p@ihug.co.nz>

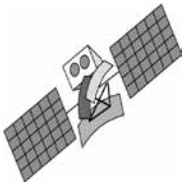
***Answers from page 35:***

Answer to *Break-In* Archives Q1: VMZAB

Answer to *Break-In* Achives Q2:ZL3AM

# CALL FOR PAPERS

## Technology Convention, Easter, Auckland 2013



Planning for the Technology Convention to be held at the Western Springs Garden Community Hall, Auckland, during March 30 and 31 (Easter) 2013, is well under way. The time has come to call for papers for presentation at this convention.

At this stage a brief synopsis of no more than two paragraphs (approximately 150 words) about the proposed subject is required. The subject content should be about developing technology in communications, be it voice, data, control technology, or anything relevant to modern electronic communication techniques.

Synopsis can be sent by Email to <conventionpapers@aucklandvhfgroup.org.nz> no later than September 30 2012.

Note: Not all synopses received may be accepted for the convention. This will be decided by the number received and how much time is available through the Easter weekend, and the relevance of the subject proposed. A more detailed proposal of the presentation could also be required at the beginning of November 2012 for the purposes of allocating time slots during the Easter weekend and planning of facilities.

**Hamads and Classified Advertising in *Break-In***

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add $5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

***Answers to crossword No.18 p27***

*Across:* 1 microwave, 4 kia, 6 period, 10 IRA, 11 tetrodes, 12 cane, 14 emit, 15 kilo, 18 eta, 19 China, 21 ice, 22 OH, 23 cm, 25 Rabaul, 27 rheostat, 28 handle, 29 Yaesu

*Down:* 1 marine, 2 capacitance, 3 White, 5 intellectuals, 7 OE, 8 DTMF, 9 Jock, 13 at, 16 shunts, 17 kaha, 18 energy, 20 north, 24 mops, 26 band.

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THEY SUPPORT *BREAK-IN*


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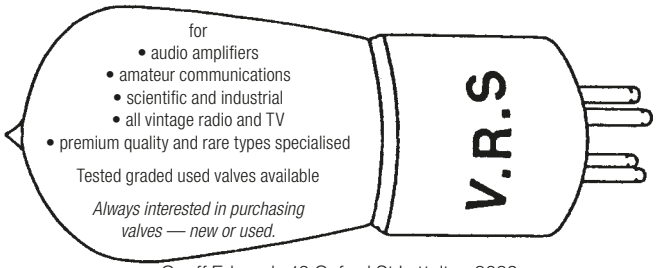
Importers and stockists of quality valves of all types and related items


for
• audio amplifiers
• amateur communications
• scientific and industrial
• all vintage radio and TV
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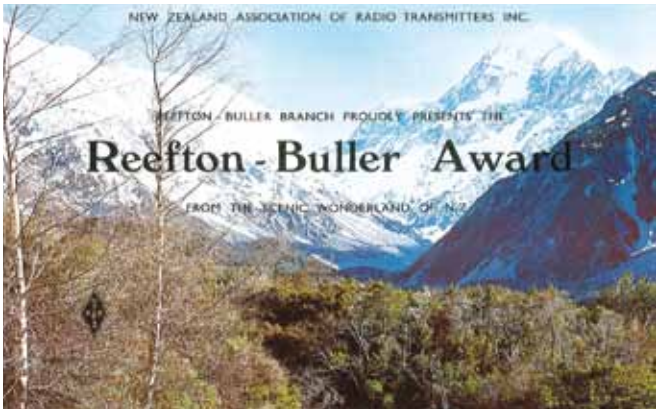
Tested graded used valves available
Always interested in purchasing valves — new or used.
V.R.S

Geoff Edwards 12 Oxford St Lyttelton 8082
ph 0274 338452 or 03 3289208 fax 03 3289207 email tubehead@xtra.co.nz

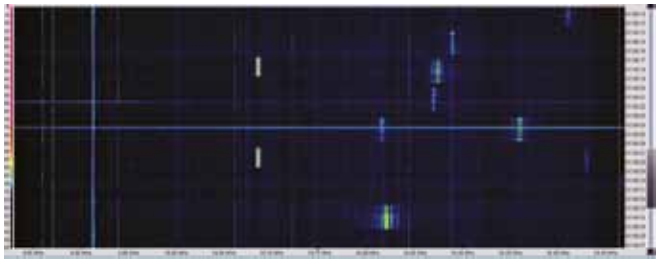
*The busy Radio Tek session.*




*Reefton-Buller Award.*

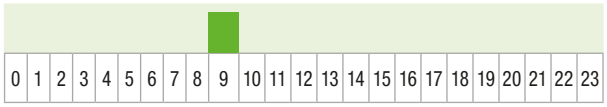
*Polar Satellite Launch Vehicle-C21 (PSLV-C21), hurtled towards the skies ferrying the two satellites SPOT 6 (French) and PTOTERIES (Japan).*

*Many Radio Tek students braved the rain to show off their projects.*

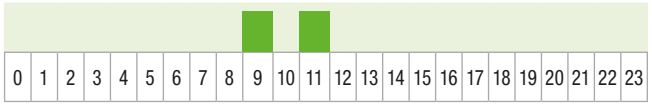


*State of the 30 m band on 8 September 2012.*

**17 m: 1 QSOs**

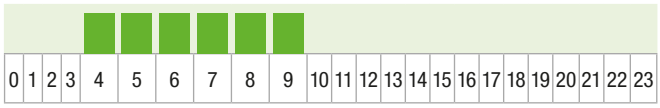



**20 m: 3 QSOs**

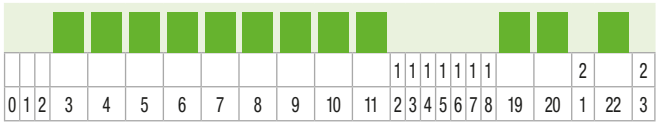



## ZL/FH qsos all September

**17 m: 14 QSOs**




**20 m: 33 QSOs**

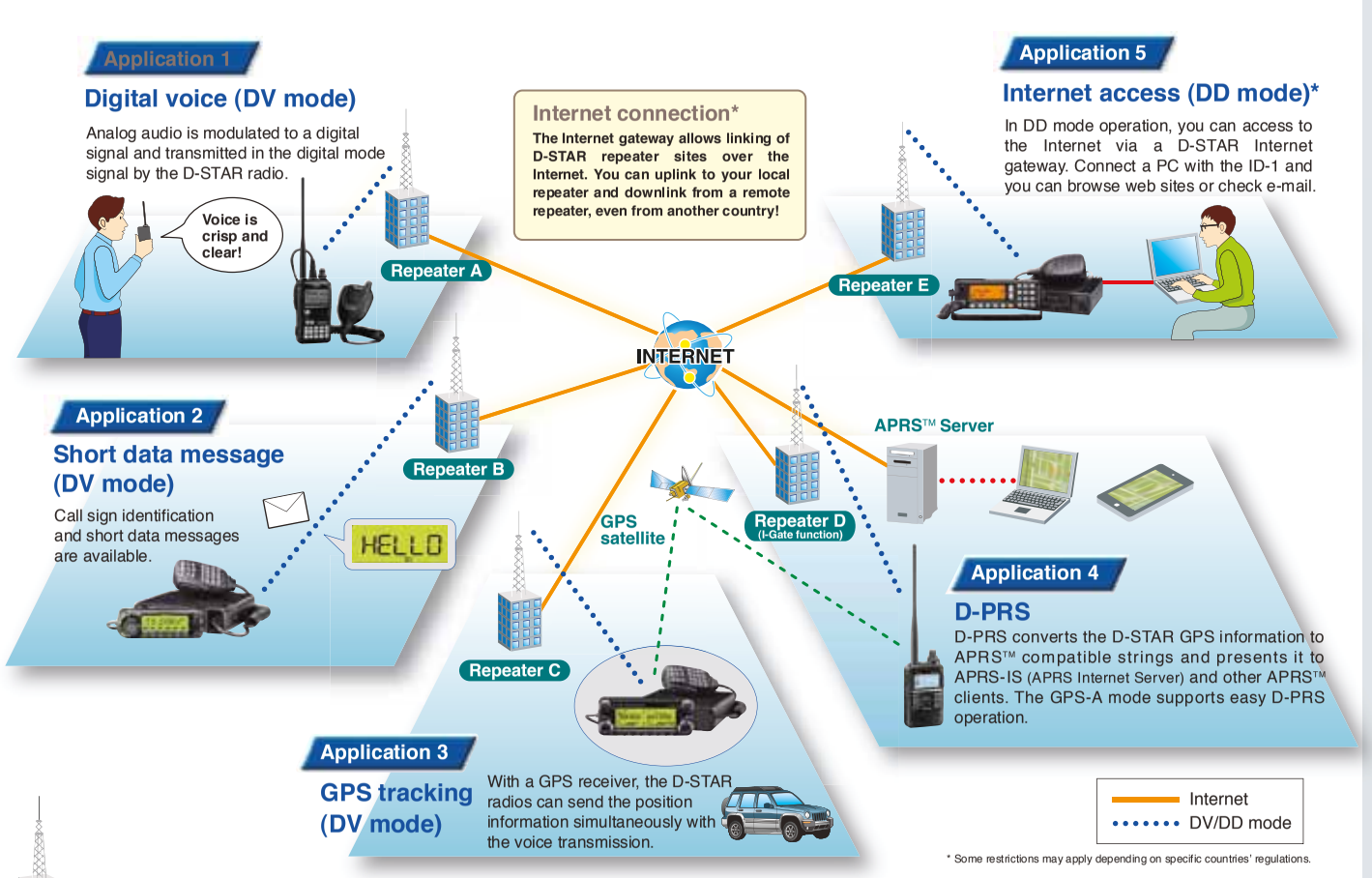



## ZL/FH QSOs all years

## CLUB LOG: Sample page

# Five Examples of Having Fun with D-STAR

Have you ever thought about if you could access the Internet from ham radios?
Or have you ever thought if you could communicate with a friend in another city or country using a simple haudheld radio?
Or want to send a simple text message, or know the call sign of whom is on the air right now?
The D-STAR (Digital Smart Technology for Amateur Radio) system is such a system where you can easily do these functions without using a tricky gadget or complicated facilities.


Application 1
Digital voice (DV mode)
Analog audio is modulated to a digital signal and transmitted in the digital mode signal by the D-STAR radio.
Voice is crisp and clear!
Repeater A
Internet connection*
The Internet gateway allows linking of D-STAR repeater sites over the Internet. You can uplink to your local repeater and downlink from a remote repeater, even from another country!
Application 5
Internet access (DD mode)*
In DD mode operation, you can access to the Internet via a D-STAR Internet gateway. Connect a PC with the ID-1 and you can browse web sites or check e-mail.
Repeater E
INTERNET
Application 2
Short data message (DV mode)
Call sign identification and short data messages are available.
HELLO
Repeater B
GPS satellite
Repeater D
(I-Gate function)
APRS™ Server
Application 4
D-PRS
D-PRS converts the D-STAR GPS information to APRS™ compatible strings and presents it to APRS-IS (APRS Internet Server) and other APRS™ clients. The GPS-A mode supports easy D-PRS operation.
Repeater C
Application 3
GPS tracking (DV mode)
With a GPS receiver, the D-STAR radios can send the position information simultaneously with the voice transmission.
Internet
DV/DD mode
* Some restrictions may apply depending on specific countries' regulations.

## D-STAR repeater

**ID-RP2C:**
Repeater controller

One unit is required for each repeater station and connects up to 4 RF modules. Transfers the received signal to the specified RF module or the Internet gateway server.

**ID-RP2D:**
1.2GHz DD mode RF module

The ID-RP2D is the DD mode RF module for 1.2GHz. It provides 128kbps high speed data communication.

Photo shows ID-RP2V.

**ID-RP2V:** 1.2GHz DV mode RF module
**ID-RP2000V:** 144MHz DV mode RF module
**ID-RP4000V:** 430MHz DV mode RF module

These are DV (digital voice) mode RF modules for the respective bands. With a combination of these RF modules, cross band operation with 144/430/1200MHz bands is available.

**RS-RP2C:**
Internet gateway software

The Internet gateway (GW) connects the D-STAR repeater station to the Internet and links multiple D-STAR repeater stations via the Internet.

ICOM **Sole New Zealand Distributors** 146A Harris Rd, East Tamaki, Auckland. P: (09) 274-4062, F: (09) 274-4708. W: www.icom.co.nz, E:inquiries@icom.co.nz

## Q&A Frequently Asked Questions About D-STAR

**Q What does "D-STAR" stand for?**

**A** The "D-STAR" stands for Digital Smart Technology for Amateur Radio. It is an open standard digital communication protocol established by JARL*. Please refer to http://www.jarl.com/d-star/shogen.pdf for technical details. * Japan Amateur Radio League

**Q What can I do with the D-STAR radio?**

**A** 4.8kbps digital voice (DV) mode and 128kbps data* (DD) mode communications are available. When using DD mode with a PC and the D-STAR radio, high speed data communication is possible. * DD mode is available with ID-1 only.

**Q Can I send data with a voice transmission?** DV mode only

**A** Yes, you can. In DV mode operation, you can simultaneously send up to 950bps of data, such as call sign, short data message or GPS position with a voice transmission.

**Q Can I use the D-STAR repeater without connecting to the Internet?**

**A** Yes, you can use a D-STAR repeater as a local repeater. Simplex mode communication in DV or DD mode is also available without requiring a D-STAR repeater.

**Q Can I make a call with other countries?**

**A** Yes, you can*. The Internet gateway allows you to relay your call to a remote D-STAR repeater over the Internet. The D-STAR repeater call sign and IP address must be registered to the gateway server. * Some restrictions may apply depending on specific countries' regulations.

**Q Can I receive a call only when the call is intended for me?**

**A** Yes, you can. The call sign squelch function opens the squelch only when your call sign is received.

**Q How do I set call signs to make a call in DV mode?**

**A** The latest ID-31E has the DR (D-STAR Repeater) mode operation and makes it easier to transmit a call using a D-STAR repeater.

When using the ID-31E, you need just three steps.

**Step 1.** MY call sign
Register your own call sign.

**Step 2.** FROM field
Select your access repeater to the FROM field.

**Step 3.** TO field
Select the destination repeater or the destination call sign to the TO field.

Then push the PTT button to transmit.

Setting example for from Bad soden, Germany to Bellevue, WA, U.S.A.